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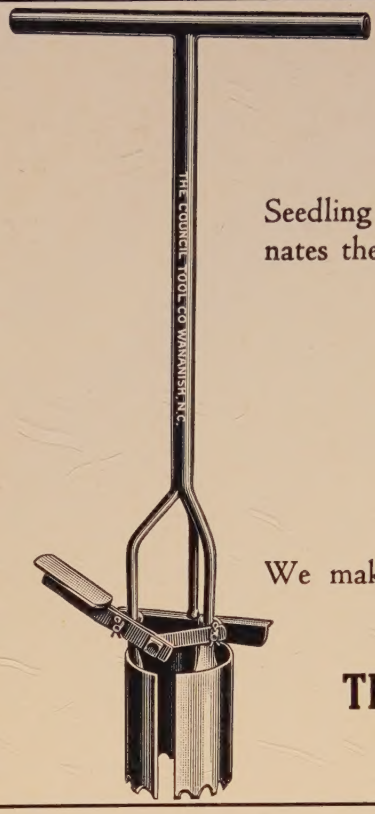

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JOURNAL OF FORESTRY

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EDITORIAL

THE REORGANIZATION BILL IN RETROSPECT

ON April 8th the House recommitted the Reorganization bill by a vote of 204-197, thus ending, for the time being at least, one of the bitterest congressional controversies in many years. Only one other recent bill, the Supreme Court bill, aroused so much public interest. There was much honest, enlightened, and intelligent support for the bill; there was much honest, enlightened, and intelligent opposition to it. There was much pressure for and against the bill. There were charges and counter charges of political trickery and chicanery. Issues entirely irrelevant to the bill were deliberately associated with it, and relevant issues were deliberately dissociated from it. Supporters of the bill were certain it should pass; opponents equally certain it should not pass. To many it appeared to be a cure for numerous governmental ills.

Now, even after the smoke has been allowed to rise for almost a month, it is still most difficult to analyze fairly and constructively even the conservation implications of the bill, or the influence of the opposition of conservationists on the final action of the House on the measure. Prejudice and confusion are dissipated only very slowly.

There is no question that an overwhelming majority of the members of the Society were opposed to the transfer of the Forest Service to the proposed Department of Conservation. This opposition was not based on selfishness or partisanship. The professional opinion of the members of the Society was that the Forest Service could render the most efficient service to the American people if it were retained in the Department of Agriculture. On this feature of the bill, the members of the Society were competent to express an opinion, and this opinion was expressed in the statement by the President of the Society at the hearings before the Senate Select Committee on Government Organization early in August 1937. That statement is now a matter of public record. It clearly reflects the position of the Council and the majority of the Society membership. For that statement no apologies need be made. It is direct and clear; it is entirely free from rancor, malice, or hostility. It is worthy of emanating from a professional group. Other professional groups also appeared before the Select Committee to object to certain features of the bill affecting their respective professional fields. These statements likewise, as a rule, were constructive, and likewise, the groups making them must be considered as competent to express opinions in their particular fields.

As time went on, other influences became involved in the consideration of the

bill. Competence no longer was considered a requisite for expressing an opinion. Prejudice, political expediency, and intrigue became major considerations. Many real issues were submerged. Artificial and unreal issues emerged. By clever arguments and manipulations by the opponents of the administration, the Reorganization bill became known as the "dictator bill." Washington was flooded with telegrams and groups opposing its passage.

At the moment, it appears to be perfectly clear that bill was killed as much or more by passion and prejudice as by reasonable and honest opposition to some of its provisions, or to the bill in its entirety. It now also is clear that there was the broadest public support for reorganization of governmental agencies. Moreover, it is reasonable to assume that the final action on the bill was the result of the combined influence of legitimate opposition to some of its provisions, to honest and sincere objection to giving the executive branch of the government additional power, and to blind opposition to the present administration.

The Society in particular and foresters in general therefore unwittingly and unintentionally find themselves in strange company. Might not a casual and uninformed observer conclude that the Society participated in a program to embarrass an administration under which forestry fared remarkably well; that it had turned partisan; and, to say the least, that it was ungrateful?

The Society rejects any accusation or inference that it intended, or that it was a party in a scheme to embarrass the administration. To be sure, representatives of the Society appeared in a professional capacity before the Senate Select Committee on Government Organization and voiced the objection of the Society to specific provisions in the bill. However, this was done in the accepted manner and with professional dignity. As the only professional organization of technical foresters in America, it not only had every right to do this, it had a definite responsibility to the American people to state its position. The Society did not object to a reorganization of governmental agencies. Neither did it share the hysterical fears of reactionary groups, nor did it participate in partisan propaganda.

The recommital of the Reorganization bill merely postpones government reorganization. It does not solve the problem. For the time being at least, the Forest Service remains secure in the Department of Agriculture, where the vast majority of competent judges believe it belongs; but this victory was not without important losses. As a result, action on many highly desirable and reasonable governmental changes has been postponed. And honest and proper though the course of action followed by the Society was, it is in danger of being misunderstood. Unscrupulous individuals and groups may embarrass the Society by attempting to attach partisan significance to its actions. Therefore the Society must repulse all such attempts, from within or without, to question the sincerity of its actions

The Society makes no apologies for its opposition to certain features of the Reorganization bill affecting forestry. In this it acted within its field of competence. The Society voiced no opinions, either directly or by implication, concerning other features of the Reorganization bill. It did not participate in a discussion of controversial issues outside the field of forestry. Any charges of unprofessional partisan activity by the Society are unfounded and untrue.

THE FUTURE OF TVA FORESTRY

By EDWARD C. M. RICHARDS

The author resigned as head of the Forestry Division of the Tennessee Valley Authority January 31, 1938. His article sharply criticizes certain policies and the lack of others by the Board of Directors, while upholding the work in forestry, soil erosion control, and wildlife management that has been done. Sincere and without animus, his opinions are wholly personal, and, although they may be shared by other foresters, they are not to be considered as the opinions of the Society of American Foresters or of the forestry profession generally.

THE forestry and wildlife work of the Tennessee Valley Authority has now been going on for four and one-half years. It has been based upon three fundamentals:

1. That the TVA, as a great project for the unified control of the flow of water in one of the country's largest watersheds, has a direct and continuous interest in forestry and wildlife work. Other forestry and wildlife agencies in the Tennessee Valley are interested in some phase of the work; the TVA, however, is the only agency with an all inclusive interest and responsibility in waterflow control, and in those forestry and wildlife activities effecting it.

2. That the TVA's special job in forestry is watershed protection on non-agricultural lands. Its special job in wildlife management is to see to it that the construction of TVA dams and reservoirs do not create biological deserts, and to develop the wildlife and fisheries resources of TVA lands and impounded waters.

3. That the TVA is obligated to cooperate with all other conservation agencies in the valley.

An appreciation of the foregoing bases on which forestry and wildlife management rests can be found in the report entitled *Review of the Activities of the Forestry Division of the Tennessee Valley Authority*, issued by the U. S. Forest Service June 10, 1937.

Starting with the three foregoing fundamentals the foresters and wildlife technicians of the TVA have worked hard and effectively for nearly five years. Their record of accomplishments is now widely known in forestry and wildlife circles both at home and abroad. Those competent to pass upon forestry and wildlife work have approved many of those accomplishments. The progress made has been on the whole satisfactory. Whenever the TVA foresters and wildlife technicians have been given a chance to do something, they have done a good piece of work. They are a well trained, honest, hardworking, capable group who know their business and are doing it as far as they are permitted. An excellent spirit of enthusiasm for the work is characteristic of this group of men and women.

But when broad policy matters involving forestry and wildlife are considered, the situation within the TVA is quite different. And this, of course, is the heart of the whole matter, because overall policy ultimately will determine detailed action. It is important therefore to understand the TVA situation relative to overall policy, as it affects forestry and wildlife work, in order to understand the issues involved. These issues affect not only the forestry and wildlife work of the TVA itself, and not only the forestry and wildlife work of other agencies in the Tennessee Valley, but also the basic principles of forestry and wildlife work over the whole nation. The TVA is a large federal agency spending hundreds of millions of dollars of taxpayers' money; its policies and accomplishments will influ-

ence, for good or ill, the public and technical viewpoint of forestry and wildlife management elsewhere in the country.

The TVA is rapidly changing the Tennessee River into a long series of lakes which will be managed for flood control, power, and navigation. The TVA owns thousands of miles of lake shoreline, and hundreds of thousands of acres of land, more than one-half of which is forest land. In its construction and operation work, TVA rubs shoulders with all conservation agencies in the basin. The policies adopted by the TVA toward forestry and wildlife management, the set-up within the organization for managing TVA lands and waters, the standards of personnel approved by the TVA for handling forestry and wildlife work, the degree of responsibility given to such personnel, the dignity with which foresters and wildlife men are treated in the TVA, and the salaries paid to them, all will set vital basic precedents. Hence, the professions of forestry and wildlife management are directly and vitally interested in what happens within the TVA.

Varied Concepts of TVA

There are decided differences of opinion within the TVA as to just what the TVA is or should be. Three views exist and fight persistently for acceptance:

1. That TVA is a federally owned and operated electric power utility corporation. All else is quite secondary and is only permitted to exist because (a) it, like dam construction, must go on if electric power is to be generated; or, (b) the other activities are so generally popular and worthwhile that it takes more courage on the part of the advocates of this "power concept" openly to throw it overboard, than to pay lip-service to it and quietly work under cover to hamstring it and keep it insignificant.

2. That the TVA is an adjunct to local agencies, such as the land-grant colleges and extension services of the seven valley states. Except for dam construction and similar work, which manifestly is quite impossible for the local and state agencies to perform, the advocates of this concept believe that the Authority itself has practically nothing in the way of a job of its own to do; that it should merely get money from Congress, pass it out to local and state agencies, and let them do everything in their own way, with personnel of their own choosing. Knowing little or nothing of either forestry or wildlife, this group holds firmly to early pioneer ideas of land ownership, land use, and conservation. It thinks of forests as small scattered farm woodland tracts. It thinks of foresters as extension workers to be called in for advice and suggestions by the county agricultural agents and farm owners. As the farm woods is, in their minds, only a minor part of the farm, so the forester or the wildlife expert is only a minor technician, quite unfit for large responsibility in land management and policy determination. One can imagine the attitude of this group toward the many important problems of forestry and wildlife management confronting the TVA.

3. That the TVA is an unique effort on the part of the people of the United States, through the federal government, to solve the major problems of a great watershed. The advocates of this third concept propose to approach the job with a scientific attitude. They have been assembled from all over the United States; they are spending most of the money—in engineering—and are doing most of the work. To them the TVA is simply a large federal organization, with a very clearcut, definite job. They believe that the other federal and the state organizations are important, and that TVA should cooperate with them fully, but that the TVA should not turn over to them, however, the work of the TVA itself.

So much for the three concepts of what the TVA is, and what its work should be.

as viewed from within the organization itself. It is important for the forestry and wildlife professions to understand these three concepts and to recognize their influences upon the conservation work of the Authority.

Conservation Policy Needed

When the TVA was established in 1933 the forestry and wildlife programs had to be created. No outline for them was available, and the wording of the TVA Act was vague regarding conservation. In general, the forestry, soil erosion control, and wildlife programs have had to be vigorously fought for. By no means were they all laid out in advance and freely accepted from the start.

So much for background. Now what about the future? What important issues face the forestry and wildlife forces in TVA?

Three important issues await clarification. But each calls for the one thing that the Board of Directors of the TVA, as a group, has tended to avoid, namely, the open, permanent commitment to an official, acknowledged policy. In the early part of 1934 the Board adopted an official forest policy, which is part of the U. S. Forest Service report on the activities of the TVA Forestry Division. After this report was published, however, and the Board—two members sitting, I understand—were reminded of this early, official forest policy, it was cancelled. Just what can be expected in the way of adequate permanent decisions in important policy matters remains to be seen. It will be pertinent, in any case, to mention the three issues involved, in order to place them upon the agenda for future policy determination.

Watershed Protection

First is the question of responsibility for watershed protection over the whole valley. The role of the U. S. Forest Service in acquisition and management of the National Forests in the valley to insure watershed protection is clear enough, as is also its role in assisting in valley-wide forest fire control under the Clark-McNary Act. The seven state forest services, however, own only small areas of state forests and parks. Their forest fire control activities on private lands are financially limited, hence they contribute relatively little to watershed protection. There remain only the Extension Service and the Soil Conservation Service among the federal bureaus, and the state game commissions among the state agencies, in the field of land-use improvement. The latter, however, do not own and administer much land, and the Soil Conservation Service is not working in the valley at all.

The Forestry Division of the TVA recognized the importance of watershed protection from the start in October 1933. With C.C.C. assistance it has made a beginning on certain limited phases of the problem. The TVA foresters and erosion engineers have done much to make both the people of the valley and of the TVA soil erosion conscious. About one and one-half years after the Forestry Division began its campaign against erosion, the agricultural extension forces in the valley started a large terracing program on crop lands, and the fertilizer and agricultural groups in the TVA began to participate in it. Nevertheless the Board of Directors have not officially assumed, and have not openly announced, that watershed protection is an obligation of the TVA.

True, money was allocated the Forestry Division to plan for and direct the C.C.C. camps in erosion control and reforestation work. Also, through the Agricultural Department of the TVA, the extension services in the Valley were subsidized by turning over money to them for what are called "contract payments." Under such "contracts" the extension services employ assistant county agents to help the regular county agricultural ex-

tension agents. This system unquestionably has helped educate the farmers in their use of crop and grazing land. Terracing and strip cropping and the use of cover crops on agricultural lands have become increasingly popular. The distribution of TVA fertilizer as an inducement to improved farm practices has helped.

All these activities are good for watershed protection, because proper farmland use is a vitally important part of it. The foresters and erosion engineers of the TVA have cooperated with the county agents and their assistants, the former working on the non-agricultural lands. But the overall policy arrangements and commitments at the top are quite unsettled, and for that reason the TVA is open to serious criticism.

In this matter, two points of view have existed. One is the viewpoint of the agricultural men who hold to concept 2 as to what the TVA is and how it should operate. Regarding watershed protection, this group thinks of the lands of the valley as agricultural lands privately owned. It cites the past history of American land ownership as grounds for claiming that responsibility for methods of land use rests entirely upon the individual owner. Further, it takes the position that the only agencies authorized to help the individual owner are the extension services. While it probably would not be admitted, this group thinks that neither the state foresters nor the U. S. Forest Service should work with private timberland owners, especially farm woodland owners; that all such work on privately owned lands should clear through the directors of extension. They are determined to make the Department of Forestry Relations of the TVA (formerly the Forestry Division) merely a minor adjunct to the seven state extension services.

The second viewpoint is that of those who look at the problems from the broad land use aspect rather than from that of land ownership. The private owner of land naturally thinks first of his own immediate interest in land use. He is usually not interested in the effect which his own farm or forest practices may have upon floods and the control over water down stream. Under these circumstances public interest in watershed protection cannot depend solely upon the decisions of individual owners as to forms of land use.

The uncertainty of permanent ownership—and hence of the permanence of any one land-use policy—of any one piece of land, by any one owner, makes such dependence inadequate. Nor can public interest depend for watershed protection solely upon the educational efforts of the extension services in influencing the private owner in land use management. First, the work of the extension services is too general to give the needed emphasis to watershed protection in particular. Secondly, soil erosion and the destruction of our forests by fire and overcutting proceed faster than the educational program can produce practical results.

For the TVA, then, to place all responsibility for watershed protection upon the private owner, as influenced by the extension services, is to lock the stable after the horse has been stolen. The futility of such a method has been recognized by the purchase of lands for National Forests for watershed protection under the Weeks law, and by the program of state-wide forest fire prevention work under the Clark-McNary Law. In this field the TVA represents the public interest concentrated on one point, watershed protection for the protection of TVA dams and the control over the flow of water in the Tennessee Basin. No other agency—federal, state or private—has such direct interest in water-flow control. And the TVA cannot completely pass on responsibility for securing adequate watershed protection in the Tennessee Valley to any other agency. It should of course use them all and assist them all, but the TVA itself should be

the spearhead of the watershed protection movement in the valley, taking direct action where necessary.

Such are the two viewpoints. The eroding hillsides, the burning forests, the valley's streams flowing red with mud, wait for a clear-cut policy decision on watershed protection by the Board of Directors of the TVA.

Wildlife Management and Fisheries

Second on the list of important items awaiting policy action is the place of wildlife and fisheries in the TVA program. Known as the Biological Readjustment work of the Department of Forestry Relations, it has the following basis for its existence.

The construction of great dams change rivers into lakes. Silt carried by flowing water settles when the water loses velocity, and covers the streambed with a layer of mud. The drawdown of water in the reservoirs for power, flood control, and navigation prevents the establishment of permanent vegetation along the shore. Such fluctuation also interferes with the reproduction of fish and animal life and destroys its food. People living along the shores of great rivers generally gain food and often cash income from the fisheries and wildlife which are part of the river environment. The building of dams may take food and income from those people. The TVA, as the governmental agency building the dams, is also the agency responsible for resulting biological damage.

TVA is therefore obligated to see to it that restoration, where possible, is made. Where restoration is impossible—for instance in the case of the fresh water clamshell industry, which will be completely destroyed by the filling of reservoirs—TVA is obligated to make up for the damage done in other ways. By the development of the lands of the TVA around the reservoirs and the impounded waters the production of game and fish food can be maintained; supplementary income for trappers from furbearing animals can be encouraged; and work provided for guides to hunters and fishermen. These are ways the TVA may recompense the people for the damage done by dam construction.

Various federal and state agencies are interested in fish and game along the river. Each has its own particular legal authority to work in the interest of wildlife. Cooperation with the U. S. Biological Survey and the U. S. Bureau of Fisheries has been active for two years under written contract. Comprehensive written agreements involving all of the agencies and the TVA are being arranged for. Each agency, under these agreements, will agree to do a share of the work. All this is as it should be. But here also is a matter of TVA policy which must be faced by the Board of Directors.

The TVA has only agreed to do anything at all for wildlife and fisheries because of strong pressure. In order to "shorten the power yardstick" and show that its power program is a sound, profit-making business enterprise, it is trying to cut expenses, especially permanent operating expenses. Outside and inside pressure insist upon the wildlife work, however. The TVA consequently does as little of it as possible; just enough to ease that pressure. TVA consequently has agreed to build another fish hatchery on Wheeler Reservoir and to enlarge the Norris fish hatchery, if the U. S. Bureau of Fisheries will operate them, and if the conservation departments of Alabama and Tennessee will plant the fish in the lakes. Thus TVA will make a "lump-sum" contribution to fisheries, leaving it to the other agencies to carry on. But this "lump-sum" contribution by TVA is not enough to fulfill its obligations.

The management of impounded waters for fisheries and wildlife is an almost unknown scientific field. Any adequate program of restoration by TVA must be per-

manent and scientifically sound, which calls for extensive biological research. To plant fish in waters whose fitness for them is unknown is both unscientific and impractical. Building and operating fish hatcheries will not alone solve the biological readjustment problems. Rather a large-scale, permanent, scientific research program is essential. The turning of 652 miles of the Tennessee River into one long lake introduces so many intricate problems that research, adjustment, and readjustment must be accepted as an actual part of the operation of the reservoirs. This is without any question the obligation of the TVA as part of its navigation and flood control program, and it should be charged to that program. TVA is to blame for any damage done, and it is up to TVA to carry on the research required to correct it.

To date the TVA has tried to avoid this obligation by justifying research in biological readjustment under paragraphs 22 and 23 of the TVA Act. These two paragraphs authorize the Authority to make studies, experiments, and demonstrations for the purpose of reporting to the President of the United States. Such reports are supposed to lead to future legislation for the consideration of Congress. They have nothing whatever to do with plans for immediate action in TVA waters and on TVA lands. Nor has TVA's obligation to make good for the damage it has done anything to do with making reports to the President relative to future legislation.

Here then is a second policy matter facing the Board of Directors. Is the work of the Biological Readjustment Division of the Department of Forestry Relations to be charged as an operating expense to the navigation and flood control program? If not, just how will the Board adequately redeem the obligations of TVA in this field?

Land Management

The third problem calling for policy determination by the Board of Directors is the management of TVA lands. Inasmuch as these land holdings will border thousands of miles of shore of TVA reservoirs, touch practically every phase of life in the valley, and profoundly influence social conditions in parts of seven states, the policies by the Board of Directors as to just how such lands are to be managed are vitally important. Just what has the Board done in facing its responsibility in the management of this area, which will ultimately comprise upwards of one-half million acres in a long narrow strip through the center of the Tennessee Valley?

The Norris Lake Forest

Up to March 18, 1935 no comprehensive action was taken by the Board to arrange for constructive use of any of the rural lands of the TVA except for the establishment of two small park areas on Norris Lake, and for similar park use of part of nitrate plant 2, property along the Tennessee River below Wilson Dam. On that date the Board turned over to the management of the Forestry Division all the TVA lands around Norris Lake, except the two parks. The plan was to set up a demonstration of how foresters would manage lands around a large reservoir. The Forestry Division took over the responsibility and developed the Norris Lake Forest. This forest comprised 117,000 acres more than one-half of which was in forest already. Much of it needed to be planted.

The outstanding items in the administration of the Norris Lake Forest by the Forestry Division were:

(1) Its management was according to detailed, technical plans covering every form of land use.

(2) The forest was supervised as a demonstration of multiple land-use manage-

ment on a territorial basis, correlated with the management of 35,000 acres of water surface for wildlife and public recreational use.

(3) As a demonstration of sustained yield management of lands and waters the plans called for heavy capital investment in the beginning, but the project was definitely planned to be self-liquidating.

(4) A force of forest workers was to be selected, settled, trained, and given part-time employment on the Forestry Division staff. At the start only 22 workers were settled on the area, but it was the plan of the Forestry Division to add to the number as income from the forest increased.

(5) The lands and waters of the forest were to be used and productively developed in the interests of the TVA and of the local people. In a word, the Norris Lake Forest was set up and operated for nearly 2½ years as a going demonstration of a complete forest economy.

The results of the operation of the Norris Lake Forest by the Forestry Division speak for themselves. In practically every direction good work was done, in planning, fire protection, selection of workers, recreational use, fisheries, planting, and public relations. Also, financially, great progress was made. Although capital expenditures were necessarily heavy, the bulk of them had been completed. Future capital outlay would have been relatively small. Meanwhile income producing activities progressed rapidly and revenue increased in volume in a satisfactory manner. During the last month of operation of the Norris Lake Forest more than $3,800 in cash was received from various income-producing activities.

Many people who investigated the work were highly favorable in their comments. Dr. A. E. Morgan more than once stated that the Norris Lake Forest was one of the most distinctive pieces of work that the TVA was doing. Locally, the neighbors were increasingly friendly. The Norris Lake Forest administration by the Forestry Division showed that foresters knew how to plan for and administer lands around large storage reservoirs, as well as how to manage the waters of such reservoirs for public recreational and wildlife use.

In July 1937 the TVA Board (two directors sitting) officially adopted a policy for the management of all TVA lands which corresponds closely, as far as forest land management is concerned, to the original plan proposed by the Brownlow Committee on the Reorganization of the Federal Government for the management of the National Forests. Under this set-up research, investigations, and planning for TVA lands were separated entirely from administration. Plans were to be drawn by the Department of Forestry Relations and other technical planning departments, and then submitted to the general manager's office for consideration, checking, and ultimately, it was expected, for approval. After approval, their execution was left to the Department of Reservoir Property Management. The plans were to be checked by those who made them, on request of the administrative department. But neither the Department of Forestry Relations nor any of the other planning departments of the Authority had any right to give orders. They could only submit complaints, suggestions, or recommendations to the general manager's office and hope for the best.

Although more than 50 per cent of all TVA lands are now in forest, while the rest is mostly agricultural land, no technical standards for the personnel of the Department of Reservoir Property Management were set up. There was no insistence upon either technical forestry or technical agricultural training for the leading positions in that Department. The theory seemed to be that, after the technical departments of the TVA had made the plans, anybody can carry them out.

Thus the important policy determining positions in TVA land management were open to anyone. A few minor jobs might be created in the Management Department for rangers and technical advisors, but this Board action tacitly assumed that foresters are narrow technicians fit only to make studies and plans, and that forest management is not the exclusive work of foresters.

Furthermore, this action by the Board set up functional planning by entirely separate TVA departments, coordinated only through the general manager's office and through the Reservoir Property Management Department, none of whose responsible officers had to be technically trained. It resulted also in the abandonment of territorial administration under a single technically trained head.

Early in August 1937 the administration of the Norris Lake Forest was taken away from the Department of Forestry Relations, and the existence of the forest as a single entity, as previously organized, was broken up. Untrained people were placed in charge of the various parts of the work, the name of Norris Lake Forest was dropped, and many of the carefully selected and trained personnel were let go. No official records have been brought out to show what had been accomplished by the Forestry Division in its administration of the forest. The action by the Board destroyed the Norris Lake Forest as a demonstration of complete forest economy, and no effort has been made by the Board to bring out an adequate technical report explaining why.

The question of policy which should be answered by the TVA Board is this: Shall the time, money, and work of 2½ years of operation of the Norris Lake Forest as a technical demonstration of a forest economy be completely wasted?

Other TVA Forest Lands

The TVA has bought lands almost entirely to make room for the waters of the reservoirs. Such purchases tended to follow the contours of the lake margins, and involved cutting across individual properties regardless of ownership. Frequently, partitions of properties were necessary. Much difficulty was experienced because in general TVA had to buy the bottom lands, and leave to the owners the upper slopes, which were least suited to agriculture. In order to be fair to the owners suitable allowances were made, and under the circumstances credit is due the TVA departments charged with the selection and purchases of lands. On the whole, public relations involving land purchases have been good.

The minimum of land needed for a reservoir is that area below the highest contour which would be flooded. This conception was followed in the original purchase of lands for Wilson Lake, long before the TVA came into existence. Theoretically while money might be saved by such a land purchase policy, the impossibility of controlling shorelines of the lakes under such a plan militated against it. Because of the desire to be fair with owners in partition situations, the TVA has systematically followed a program of buying a narrow strip of land around all the shorelines of its reservoirs. Care has been taken to hold costs down and yet to satisfy the landowners.

The TVA lands surrounding the various reservoirs resulting from this purchase program are in general not well suited to economic management. They are too narrow and their administration is difficult. But TVA has had to buy them and must care for them. About 60 per cent is now in forest, or will be as areas unsuitable to agriculture are planted. Most of the rest can be used for grazing or other agricultural use. Only a small part is so scenically attractive and strategically located as to be worthwhile for intensive park development. On the whole, while the problem of the proper use of such lands is partly agricultural and partly

forestry, it is perhaps above all one of public relations. TVA lands extend through the middle of the Tennessee Valley from Knoxville to the Ohio River, and their management affects most of the population of the basin. Under these circumstances what general policies might well be considered by the TVA for their use?

Under the hardboiled business policy TVA lands would be managed purely on a profit-seeking basis with a minimum of capital expenditure and the lowest possible current operating cost. Most of the land would merely be protected from extreme abuse. Some of it might be leased out to individuals or corporations willing to pay cash rents. No expenditures for long-time planned development of productive use would be made. As little money as possible would be spent to make the lands socially valuable to the population of the valley and of the country.

Under the political instrument policy TVA lands would be used to build up political support for the TVA among influential people in the valley. Choice pieces might be leased to individuals or groups for various purposes and under various pretenses, but the purpose would be to gain from influential people political support for TVA in the various state legislatures and in Washington. Favoritism, patronage, and intrigue would involve the TVA with local machine politics in every village, town, county and state of the valley, as well as with similar elements in Congress. The welfare of the poor man, the person needing most consideration in the use of TVA lands, would receive short shrift. And the use of the lands in the interest of the nation as a whole would tend to be forgotten in the welter of local politics.

Under the technical conservation policy the administration of TVA lands would be based first of all upon their permanent productive capacity in the interest of sustained yield management. Secondly, under this policy, the management of TVA lands would be correlated with the proper management of other lands, both public and private, in the valley, and would furnish demonstrations of how forest and agricultural lands should be handled. Third, the management of TVA lands would be based upon a sense of public obligation to make the best use of them for the largest number of people in the long run. Short time, profit-seeking approaches and political expedience would be in the background.

The biological uses of the impounded waters and of the periodically flooded lands within each reservoir, and the determination of the various policies of management applicable to them, coincide fairly closely with those of the lands situated above highwater, as far as fundamental principles are concerned.

Such is the general outline of the problem of policy determination faced by the Board of Directors. The administration of all these lands and waters of the Authority is a fundamentally important matter. The Board of Directors is the policy determining body upon whose shoulders rests inescapably the final decision. To date the Board has not decided upon a suitable policy considering the problems involved.

At the Board meeting on July 20, 1937, when the present set-up was approved, no serious or comprehensive consideration was given to them. At that meeting not one division of the Authority interested in, and adequately trained for, the surveying, purchase, planning for, or administration of TVA lands was represented, except the Forestry Division. And the recommendations of that division were completely ignored. Only two members of the Board of Directors were present. No effort was made to call in for advice outside experts in rural land management, such as representatives of the U. S. Forest Service.

The decision reached at that time and

the set-up authorized can scarcely be taken as other than temporary. The whole matter should be thoroughly explored with the aid of competent, technically trained, disinterested advisors from outside the TVA.

Summary

Four and one-half years of work have revealed important forestry and wildlife problems facing the TVA. In some directions foundations have been laid, but by no means in any clearcut, permanently satisfactory manner. The importance of forestry and wildlife in the TVA by no means has been adequately realized. The professions of the forester and the wildlife technician as the responsible, policy-determining, managers of wild lands and waters, have not been officially recognized. Entirely inadequate conceptions as to the technical qualifications and professional standards of personnel for forest land management positions still exist. In facing the future the foresters, erosion engineers, and wildlife technicians of the Authority need the wholehearted support of the professional societies in seeing to it that these essential policy matters are properly straightened out as soon as possible in the interest of the whole forestry and wildlife movements of the country.

Recent Forest Service Transfers

RICHARD E. McARDLE, a Senior member of the Society, has been appointed director of the Appalachian Forest Experiment Station at Asheville, N. C. Doctor McArdle, who has served for the past two years as director of the Rocky Mountain Forest and Range Experiment Station at Fort Collins, Colo., succeeds C. L. Forsling who recently became assistant chief of the U. S. Forest Service, in charge of Forest Research. Doctor McArdle received his B.S., M.S. and Ph.D. degrees from the University of Michigan. He received his original appointment in the Forest Service in 1924. He left the Service to become dean of the Forest School of the University of Idaho in 1934, but later reentered government work as director of the Rocky Mountain Station.

Stephen N. Wyckoff, a Senior member of the Society, was appointed director of the Pacific Northwest Forest and Range Experiment Station, with headquarters at Portland, Ore. Formerly director of the Northern Rocky Mountain Forest and Range Experiment Station at Missoula, he succeeds Thornton T. Munger, who has requested full time for research as chief of the Field Division of Silvics. Mr. Wyckoff received his original appointment in the Department of Agriculture in 1919. He is a graduate of the University of California.

SOME IMPORTANT TRENDS IN FORESTRY IN THE UNITED STATES[1]

By H. H. CHAPMAN
Yale University

In the following paper Professor Chapman analyzes some of the more important trends in forestry in the United States. The differences, and the reasons for the differences in federal and state conservation activities are discussed; a plea is made for the retention and extension of the merit system in both federal and state agencies; and the more recent major achievements of the Society are described.

IT is a matter of much interest to note the prevailing trends in affairs of public importance such as forestry, and especially to note how these trends may differ between two nations closely associated by geography and trade and by a common heritage of law and tradition.

Possibly the most interesting difference and one of considerable significance in forest administration is the tendency to develop in the United States a strong central or federal organization, while in Canada and Australia the provinces or "states" constantly increase in importance at the expense of the central government. I do not know just why this is, but I hazard the guess that when the American colonies won their independence from Great Britain they later set up a central government having genuine sovereign powers, the states consenting, and they regarded this government, perhaps, much as Touchstone looked upon Audrey, as "a poor thing, but mine own." The thought has occurred to me, that in the British Federation the various provinces tend to regard their own local governments rather than the Dominion with much the same attitude.

The effect of this difference in the United States has been to build up in the Department of Agriculture a very efficient organization of professional foresters, of sufficient number, cohesion, and diversity of duties to act as a continual incentive to professional progress in all lines, including research, administration, and education, and to win and hold a public support that so far has enabled it to preserve the integrity of its technical standards against all political assaults no matter how strong. Whether this fortunate condition will continue is just now being fought out in one of the most important major engagements in the whole history of American forestry, with the outcome still in the balance.

The strength of the U. S. Forest Service, however, has not served to rob or dispossess the states, so far, of any of their essential rights of sovereignty over the forests in their care. The development of this federal service, originally, was due largely, and its power still lies, in the reservation of vast areas of the public domain for national rather than state or provincial forests, and the later great expansion of these National Forests throughout the East by purchase, based on a construction of the Constitution affecting the protection of head waters of navigable streams. Extension of this influence to other fields, such as fire protection and education, has been largely through the principle of federal aid to states under the Clarke-McNary Act, which carries with it some voice as to the standards of performance in expending these funds.

[1]Address delivered at the Annual Meeting of the Woodland Section of the Canadian Pulp and Paper Association, Montreal, January 17, 1938.

This development of federal efficiency and strength has been almost entirely under the U. S. Department of Agriculture and the forestry work is thus closely coordinated with all other agencies dealing with organic resources such as soil conservation, animal husbandry or grazing, and wildlife management.

It happened, however, that when this policy was finally given its present form in 1905 by the transfer of the National Forests to the Department of Agriculture, no attention was paid to the few, scattered and sporadic instances where land had been withdrawn for National Parks in the West, such as the Yellowstone, Sequoia, and Yosemite. The army had charge of these parks, and they remained in the old Interior Department. Out of this neglect to coordinate these parks with the National Forests has grown a veritable Pandora's box of troubles. In 1915, with the creation of a unified Park Service in the Interior Department, this Department found itself the heir apparent of an inherent widespread sentiment for preservation intact of the primitive wilderness.

As our urban population, most of which is naturally imbued with this emotion, grew to exceed the rural element in numbers and influence, so the sentiment for preservation, and complete exclusion of all commercial use of these forests and mountains, increased in strength. Several millions of acres of new national parks were, very appropriately, withdrawn from use and, of necessity, transferred to the Department of Interior. Not satisfied with these grants, and alarmed over the decreasing importance of the Department due to its wholesale dissipation of the public lands in its charge to private ownership, and the consequent shrinkage of its personnel, the Department over a long period has undertaken to capitalize this park sentiment in an effort to recapture the National Forests, in the interest of its brand of non-use conservation.

Again, after stubbornly resisting for decades all attempts and persuasion to place the public grazing lands under federal regulation, similar to that so successfully accomplished since 1905 on the National Forests, this Department, unfortunately with the consent and aid of the Forest Service itself, secured legislation creating federal grazing reserves. It then proceeded to manage these reserves almost entirely in the interest of large stockmen to the damage of small owners, and began a vigorous drive for unification of grazing policies by the transfer of the entire Forest Service, on the theory that the tail should wag the dog for the benefit of the owner of the tail.

This drive culminated in the present Congress in an effort to rename this agency the Department of Conservation, making it the recipient of all conservation activities having to do with public lands or any agencies whose duties included their administration, with utter disregard of the unified program of conservation of organic resources in the Department of Agriculture, the whole history of which was ignored. The issue largely depends on whether urban sentiment is to be swayed entirely by emotion and the desire for restoration of primitive, non-use conservation, or whether commonsense and a proper adjustment of economic multiple use will triumph. So we have our troubles and the end is not yet.

The merit system and the efficiency of the U. S. Department of Agriculture have actually rested in a large measure on the fact that this Department is in effect a huge research agency, and it has not yet been conceded that research can be adequately handled by political appointees. The inherent traditon of the Department is therefore one of a scientific approach based on Civil Service and merit, which has been carried over into the administration of the public lands or forests and has been strong enough to resist political pressure in these agencies, with the exception of some of the more recent under

takings of the New Deal such as the C.C.C. Even here, in strong contrast to conditions prevailing in the Department of the Interior, professional positions were largely salvaged from politics at the start, which practice has been largely responsible for a very fair performance of the C.C.C. in national and state forests.

The same condition explains the apparent analogy under which in national affairs, the Department of Agriculture is the logical agency for the custody of National Forests and for the entire program of conservation of organic resources, including grazing and wildlife, whereas, within the various states, exactly the opposite condition has prevailed. Agriculture as a state administrative agency is a forlorn skeleton of what it might be, had the research function been exercised by the state. Instead, it was concentrated in the agricultural colleges, subsidized to a large extent by the federal government, while the state departments of agriculture retained only certain regulatory functions and now are largely political. As a result, forestry and other forms of conservation in the states were organized as separate departments, independent of agriculture. This fact has been cited, by analogy, to justify a similar course for the federal government, where exactly the opposite conditions hold true. By thus capitalizing a generality, a plausible but utterly fallacious argument is advanced, which has had support from very high authority and adds to the difficulty of a permanent solution. Such a solution will only be reached by following historical and sound lines of progress and consolidating organic resources in the U. S. Department of Agriculture, including the grazing on the public domain, and ultimately the national parks. When these measures are accomplished, our conservation house will cease to be divided against itself, and we can press forward in a united drive in which all interests will receive their just recognition.

In another field, our conditions are quite different from those in the Dominion. Over three-quarters of our forest area, including the entire eastern section and most of the heavily timbered areas of the West, was alienated from public ownership by the traditional policy of the Department of the Interior which reflected public sentiment, until the advent of the new conception of permanent federal management in 1899. The result is that we had no public control or check on the economic forces which led private industry to devastate vast areas with no regard for the future or the possible destruction of the resources. This is quite different from the Dominion policy of retaining ownership of non-agricultural lands and disposing of the timber under leases. Land ownership at least gives the public the power to determine the conditions of exploitation. Whether this power is wisely and effectively used depends almost solely on the maintenance of a technically trained administrative force, free from political interference and capable of determining and enforcing regulations which are economically possible and will be given the support of the users and public alike. What success you have had in thus utilizing the power of public ownership is not for me to say. Within our more restricted field of National Forests I can say that it is almost completely successful and is improving constantly, to the ultimate good of all concerned.

Our difficulty is far more serious. What shall be done to check forest devastation on privately owned lands? And through what agency, federal or state, shall the attempt be made? After twenty or more years of agitation, the result so far has been to reject the plan of direct federal regulation. The nearest approach to this was through the N.R.A., under which law private owners were required under their codes to adopt minimum practices tending to leave the land in a pro-

ductive condition—possibly comparable to measures sought on the public forests in certain of your provinces. Due to other features this law fell by its own weight, was openly flouted and finally buried by the Supreme Court.

Instead, the older Clarke-McNary law was relied on, with its principle of federal financial and educational cooperation through the states. In the states reposes the responsibility for fire protection and taxation, which are the two great elements affecting the possibility of private forestry practice. The weakness of many of the states lies in their apparent inability, as yet, to divorce their forest or conservation services from political influences, with the result that, except for the above two fields, efforts to extend regulation by states over private practice have been completely abortive, even in those states possessing sound technical services, of which there are many. Meanwhile, a nucleus of forestry practices has been retained from the N.R.A. on a voluntary basis, especially in the South and the Pacific Northwest, where selective logging has been greatly advanced by the advent of tractors in place of steam skidders. It is my belief that this subject will, in the near future, receive another airing with results which I cannot foresee.

Enough has been said to indicate that, thanks partly to fortunate historical circumstances and partly to the vigor and initiative of great leaders like Gifford Pinchot, Theodore Roosevelt and others including Dr. B. E. Fernow, later dean of the School of Forestry at Toronto, professional foresters, both individually and through their organization, the Society of American Foresters, have played a bold and commanding part in determining the trends of forestry in the United States. Even in the forty-two states which have established departments of conservation or forestry, the battle for the preservation of professional integrity has been incessantly waged along all fronts, defeats in one state being matched by victories in another, with a constant trend towards the establishment, even by constitutional guarantees, of Civil Service on the basis of professional merit for the administration of these basic resources. In fact, the worst set-backs which state forestry has received, notably in Indiana, Minnesota, and Pennsylvania, have been due to the triumph of the insidious and vicious principle that in political affairs the end justifies the means, and the more idealistic the party aims, the more unscrupulous may be the measures taken to secure party domination and the triumph of these ideals. Examples are not lacking of reformers who would gag the press and set human liberty and justice at naught in the pursuit of rainbows. We in the United States have had recent experiences with this trend, so much so that I have come to believe that the means are far more important than the goal, and that the survival of democracy on this continent is contingent almost solely on our ability to avoid hasty and arbitrary measures and to permit reforms to proceed by the slow and considered processes of trial and error, and of public education through prolonged debate and arguments. Haste and confusion have already brought many of our most ambitious and promising attempts to the verge of ruin and abandonment. This is not an example which should be followed in this Dominion.

The position of the professional society of foresters in the United States on all public questions is to assure to its members absolute freedom of expression regardless of their economic beliefs or political affiliations, and so firmly entrenched is this tradition that in a Society of which 75 per cent of the members are publicly employed, federal policies are freely criticized and analyzed. This you may see for yourselves by reading the report of our last annual meeting

at Syracuse, N. Y. We believe that the axiom that a democracy can continue to exist only through preserving the freedom of the individual to criticize his government is powerless unless given practical enforcement, and we are fortunate in possessing such a combination of elements in the Society that we have had no difficulty in adhering to these principles. Where ballots are taken by referendum on public policies these ballots are secret, and the results express the honest and independent convictions of our members as professional foresters and not as employees of a public or any other agency.

The Society, through constant effort toward this end, is rapidly attaining the character of a true professional body of like status with engineers, physicians, lawyers, architects, and other and older organizations which have gone through the period of development and are now well supported by adequate dues.

As an example of cautious and well-considered but bold initiative possible for a professional society, I may cite the stand taken in behalf of an irrigation tunnel in Colorado, which because of its route lay beneath a national park was opposed by many organizations, in spite of the proved facts that it nowhere touched the surface of the park or injured it in any way, and that without it, a great region was condemned to economic loss and bankruptcy. Professional opinion must be free from emotional prejudice and based on well-considered facts. If such a Society is capable of rendering this class of service to the public its value is inestimable and its reputation secure.

As an offshoot, or indispensable adjunct to the Society's maintenance of professional standards, it undertook and completed a grading and classification of the institutions claiming to give professional instruction in forestry, developing for this purpose a method which not only accomplished this result without criticism even from the rejected schools, but which was free from any suspicion of personal prejudice or bias. In the first grading but 14 out of 24 institutions were accepted. Later four more were added and at present two others are under consideration. The rejection of a school has, in practically every instance but two, resulted in almost revolutionary improvement in financial support, faculty provisions, and equipment, and has done more than any other measure to establish forestry on a professional grade, as distinguished from a mere vocation.

The territory covered by the Society of American Foresters includes the United States and its possessions, Canada and Newfoundland, with "corresponding members" from any other country. No effort has been made by the Society to extend its membership north of the boundary, for it is recognized that the interests of the profession are best served here through having a separate society concentrating on your own peculiar problems, which are numerous and varied, and greatly need vigorous attention. In the private field, Canadian foresters have had far greater success than in the United States in selling their services to employers. In the public field, you have suffered losses and vicissitudes which it is in the public interest to overcome, chiefly by arousing a universal demand for the elimination of politics in the field of natural resources on which, to such a large extent, the future existence of your population depends.

Foresters who are desirous of affiliation through active membership with the Society of American Foresters are welcome. If any of your institutions desire to avail themselves of the offer made them years ago of grading such institutions on the same basis as that used in the United States, the Society will be glad to extend to you this service. Approval of

such schools enables its future graduates to enter the Society on the basis of their degree in forestry. Without it each applicant is judged on his record as to whether or not he has acquired a theoretical education in the fundamentals of forestry equivalent to that given by an approved school. If any desire exists for such grading, it may be of advantage to secure it through the Society by a system which has proved universally acceptable so far.

In conclusion, the future of forestry as a practical program for conserving our great resources with their attendant industries is, in my opinion, inextricably bound up with the firm establishment of a non-political, experienced and efficient service of men trained professionally in the use of a body of knowledge chiefly attained through the combination of actual experience in woods operations with the findings of a broad and comprehensive, well-supported program of fundamental research.

Lee Muck Appointed Director of Forests for Department of the Interior

LEE MUCK, a Senior member of the Society, was recently appointed director of forests for the U. S. Department of the Interior, a newly created position. He acts as coordinator of all activities in forest conservation and management on public lands under the jurisdiction of the Department.

Mr. Muck studied civil engineering at the University of Wisconsin and forestry at the University of Michigan. He entered the Indian Service in 1913 as forest assistant, and rose through successive grades to director of forestry in the Office of Indian Affairs, to which position he was appointed last year.

In his work with the Indian Service Mr. Muck specialized in timber appraisal and valuation, and helped prepare selective logging and sustained yield plans on many Indian reservations. He has been connected with timber sale administration. and has been responsible for the management of 46,000,000 acres of forest and range land and their wildlife resources on the Indian reservations. He has had twenty-five years of service as forester in the Interior Department.

David A. Shoemaker
1893—1938

DAVID A. SHOEMAKER of Alburquerque, N. M., a Junior member of the Society, who had been in charge of grazing in Region 3 of the U. S. Forest Service, died May 19, 1938. He would have been 45 years of age on his next birthday.

Born in Custer, S. D., Mr. Shoemaker had attended the University of Nebraska where he took courses in forestry, botany, and range management. He entered the U. S. Forest Service in 1916 as forest guard. At the time of his death he was assistant regional forester in charge of wildlife and range management.

THE SELECTION OF JUNIOR FORESTERS

By JOHN B. HATCHER
U. S. Forest Service

The recruitment of men into business or service organizations ranges in investigative completeness from a single contact by letter to a multitude of tests which seek to determine the candidate's qualifications for the present job and for future development. For many years the U. S. Forest Service has employed men about whom little is known except that they have passed the Junior Forester examination. This method of selection has presumed survival of the technically fittest, and appointment has proceeded on the corollary assumption that an 85 man is better than a 70 man. But what of the many character and personality traits that lead to success? To what extent do they run parallel to technical knowledge and examination proficiency? In view of this lack of definite information on these questions, a study was undertaken in Washington in the Division of Personnel Management of the Forest Service during the winter and spring of 1937.

THE primary objective of this study was to find out how to select the best possible men for employment in the Forest Service. Secondary objectives were to aid in the development of technical civil service examinations, assist the forest schools in evolving forestry curricula, and to further constructive career services. In the process of working out the primary problem, it was apparent that much of the material studied[1] would apply directly to the secondary objectives.

Procedure

1. In order to establish a sound basis, a Junior Forester Type Analysis form was sent to all regions and experiment stations requesting a detailed analysis of the ten best and the ten poorest Junior Foresters employed within the past few years. Some 300 men were rated on some twenty-odd factors of education, scholastic record, experience, background, and personal qualifications, as well as being tersely characterized by the reviewing officer on their most and least desirable traits as forest officers.

The analyses were studied by individual factors and by related groups of factors in an effort to locate discriminating indices, and to determine if such were measurable. Composites were then set up by consensus for a best and a poorest man.

2. The active personnel records of all Junior Foresters appointed from 1924 through 1934 were examined for key characteristics, with special attention accorded to outstanding men. In addition all resignations, dismissals, and disciplinary personnel cases during the past ten years were studied in an attempt to determine the underlying causes.

3. The average yearly salary increase was plotted against grade received on the

[1]In making this study the author has used the following miscellaneous data and publications:
The active personnel records of the men appointed in the U. S. Forest Service from the Junior Forester registers of 1924 through 1934.
Type analyses on 300 Junior Foresters, 1-6-37.
The personnel files of professional foresters who have resigned, who have been dismissed, or whose services have been terminated from the U. S. Forest Service in the past ten years.
The Junior Forester examinations, 1917-1937.
Professional Forestry Schools Report by H. H. Chapman.
Forest Education by Graves and Guise.
An Outline of Statistical Methods by Aiken and Colton.
The Journal of Forestry.
Publications of the American Management Association.
Publications of the U. S. Civil Service Commission.

Junior Forester examination for each man, and a straight line correlation by statistical analysis was run

a. for the entire group

b. by yearly registers

c. for appointees from 1924-31 (discussion type examination)

d. for appointees from the 1933-34 registers (short answer type)

e. for grades 64.27-70.00 versus 70.01-75.73 when eligibles were certified from below 70 because of an exhausted register.

These data were checked for significance, reliability, and chance of error.

4. The Junior Forester examinations from 1917 through 1937 were closely compared by type, scope of subject matter, difficulty of questions, per cent of passes, and average passing grade in order to disclose any variation in severity.

5. In addition to the above steps, a number of other informal approaches and comparisons were made. Due to the incomplete data and results, these are not listed separately.

Conclusions

1. There is no correlation between the grade made on the Junior Forester examination and subsequent advancement in the U. S. Forest Service.

2. The following factors afford no selectivity:

a. Occupational classification of parents.

b. Early environment (locale)—city, small town, farm, plains, wooded section, or forest.

c. Extra-curricular activities in college.

d. Judgment of comparisons (first reaction to similarities or differences).

e. Interests, in men or things.

f. Relative devotion to study, objective activity.

3. Prior experience in general woods, farm, or engineering work is advantageous when contrasted with miscellaneous work experience or lack of such experience, but it is not a good criterion for differentiating between the best and the poorest prospects.

4. The relationship between successful work and good health and vitality is close, but of limited selective value.

5. The groups of characteristics listed below are excellent selective indices.

a. A work-business division of executive and organizing ability, judgment and common sense, reliability, practicability, and persistence.

b. A personal-qualities group of leadership, cooperation, ambition, adaptability, and personality.

c. A mental-reactions group of intelligence, mental curiosity, imagination, and enthusiasm.

6. The man's scholastic record in college furnishes a reliable index for his future success in the service.

7. The completion of graduate work has good selective value.

8. The scholastic rating of the forestry school attended is sufficiently selective to encourage preferences.

Discussion

In the discussion of the foregoing results it might be well to mention that whether the implication be negative or positive, the application may be along positive lines.

Since the lack of relationship between examination grades and advancement caused a measure of surprise, the search for reasons or modifying influences was made as complete as possible. Lack of available promotional opportunities; the tendency of the more studious, higher rating men to lean toward, or be selected by, research; time between graduation and taking the examination; variations in examination severity or grading; the practice of holding men in subordinate positions; differing personnel policies and a number of possible minor influences were studied. There is no question that the above conditions have affected

individual cases, but not enough to change the general conclusion.

The various differences from year to year in the Junior Forester examination were judged to be largely compensatory. However, some strong and weak points in each type were noted. Through 1931, the discussion type emphasized more detailed, technical knowledge over a fewer number of courses, required supporting reasons clearly expressed, restricted the sphere of forestry. Nearly half the candidates passed. From 1933 to 1936, the short answer type has required more comprehensive treatment of forestry and allied subjects, pertinent data segregation, and better judgment of comparisons through similar appearing answers. It partially guides the candidate's thinking and expression, and is open to good guessing. In this period one man out of four passed.

The practical aspect has directed the change in the type of questions. Instead of the hundred that formerly took the examination, there are now well over a thousand. This has necessitated a system of mechanical marking to secure uniformity and keep costs down. In spite of certain obvious handicaps, the short answer type is much more flexible and better adapted to the changed conditions.

The Forest Service has been getting at least a fair share of the best men, regardless of the apparent non-selectivity of the examination. This is attested by the fact that a number of the men are repeatedly being offered jobs by other agencies and independent organizations. It is possible that somewhere under 70 is a grade below which the men fail because of a lack of technical proficiency. Absence of records on men in this category forestalled investigation of this approach.

Since men in administration exhibit diametrically opposite trends from men in research in regard to judgment of comparisons, interests, and in the degree of studiousness or objectiveness, the lack of selectivity appears to be due to differences in training. It is possible that testing for these qualities prior to in-service training might result in more harmonious placement of men.

In personnel selection there is a widespread tendency to take character traits and personality more and more into consideration. A recent survey published by the American Management Association revealed that 90 per cent of office workers failed to hold their jobs, and then 75 per cent failed to advance because of character traits rather than a lack of specific skills. Because of the realization of this fact, many corporations are utilizing aptitude, interest, and personality tests as a guide in employment. An applicable test could be combined with interviews conducted by the recruiting officer on his annual visits to the forestry schools.

The scholastic record of a man is highly significant. A high academic rank indicates an alert, accurate, disciplined mind, and usually a sense of cooperation, a pride in competitive accomplishment, and a measure of good manners. This record of a number of appraisals of the man by his educators, into which personality has entered to some extent, is worthy of close consideration.

The type of training given in the forestry schools is so closely tied in to the Junior Forester examination that a change in the latter would necessitate a parallel adjustment in the school curricula. The lack of selection as well as the integration of forestry with social problems suggests the need for a different approach. A large measure of specific facts and statistical information soon becomes obsolete. This condition can be gradually improved by broadening the treatment of a given subject, and by including courses in principles of economic, social, and human relations as a requirement for a forestry degree. Moreover, it may prove advantageous to shift some technical courses into the first two years, or to establish a truly comprehensive general forestry

course at this time. The intensity of assimilation can thus be relieved, an opportunity provided for consideration of the many sides of forestry, and the perspective brought into a sharper focus.

At the same time these precepts might be incorporated into the Junior Forester examination, decreasing by degrees the technical nature of the questions, and substituting more problems and situation cases designed to test judgment, common sense, planning and organizing ability, logic, adaptability, and human relations.

Linked to the above should be a keener appreciation of career services as a recruitment tool. Earlier recognition of this opportunity in career guidance, as well as in recruiting among the 7,000 students now in forest schools, should not be overlooked. It is likely that most of these students are unfamiliar with the duties of the basic jobs in the many agencies and organizations employing men with forestry educations. For breadth of viewpoint these job descriptions should be presented by qualified representatives for the Forest Service, National Park Service, Soil Conservation Service, Tennessee Valley Authority, the Bureaus of Biological Survey, Indian Affairs, Plant Industry, Entomology and Plant Quarantine, the various state forest services, and commercial organizations. Coverage of the problem is the schools' responsibility, but it might well be coordinated under the auspices of the Society of American Foresters. We know that dissatisfied men often result from not being fully acquainted with the work situation, yet little has been done to supply this information. Here is the first chance to advise men and indirectly benefit the Service by adhering to high personnel standards in selection.

After appointment the men enter a probationary period in which testing and training go hand in hand. Undeveloped abilities in organization, management, adaptability, and matters of balance, judgment, and practical initiative are simply not revealed by examination. Hence they must fall within the investigative duties of ranger, supervisor, and personnel officer. In this process such personal attributes as integrity, ethics, mental curiosity, imagination, enthusiasm, tact, persistence, and many others must be assayed and valued. This can not be done without frequent, planned contacts followed by complete, written records. Since few men are separated from the Forest Service because of a lack of technical knowledge, a somewhat larger number because of failure in work ability, but by far the most through direct or indirect personality traits, it becomes apparent that much depends on a careful appraisal of the man's personal agreeability and adaptability.

To secure the greatest effectiveness, a simple, flexible plan should be devised. It may be that specific jobs and test situations, supplemented by informal interviews and general social contacts will produce the most consistent results. Normal daily relations under a wide variety of circumstances offer many openings to probe into a man's actions and attitudes. If the importance of recording all favorable and unfavorable reactions is realized, a reliable appraisal should be rather easy to assemble.

In fairness to both the men and the Forest Service, early recognition of both eliminative traits and outstanding qualifications should be constantly sought. Such an attitude is vital to successfully administered career services and to a humanistic personnel policy. If we neglect this important phase of personnel management during early stages of employment specific abilities may be overlooked, or time and effort may be consumed on disciplinary personnel cases which might otherwise have been averted. In either case complete information is essential.

Recommendations

These men, as a product of forestry education, experience, examination, an

probationary work, have gone through an extensive period of testing and training. To improve the Forest Service's means of advising, evaluating and placing incoming men, it is recommended that the following data be furnished:

1. A scholastic, personal, and general appraisal of each man by the dean of the forestry school.

2. A transcript of the courses taken and grades earned in college to be forwarded by the forestry schools at the time of graduation.

3. A comprehensive job application to be submitted to the recruitment officer by each man before being interviewed.

4. A report on each prospective Junior Forester by a permanent recruitment officer. This appraisal should be based on two or more interviewing contacts, with enough time devoted to each man to minimize nervous tension. This is regarded as a highly desirable measure.

5. Utilization of the annual analysis of the Junior Forester examination questions made by the Division of Research, Forest Service. If approval of the Civil Service Commission could be secured, a copy of the candidate's answers would aid in placement.

Further recommendations are as follows:

6. Modification of the Junior Forester examination questions to include more of the social and economic relationships in forestry, less emphasis on purely technical questions, and elimination of memory questions to a greater extent.

By the use of situation and problem questions, the examination can be made to furnish a better analysis. Such a qualitative approach would warrant shortening the examination and would encourage the use of supplementary indices as suggested hereafter.

7. If the approval of the Civil Service Commission can be obtained, it is recommended that the answers be supplemented by a brief, supporting reason. This would reduce guessing and stress logic, clarity, and common sense.

8. The use of an intelligence test to supplement the technical examinations.

9. The use of an aptitude and interests test to explore personality, aid in placement, and add to or corroborate the recruitment officer's report. It is recommended that the Civil Service Commission conduct studies to determine the most applicable type.

10. The infusion of broad social and economic philosophies into forest school education, the presentation of more forestry work earlier in the scholastic program, instruction to promote better understanding of man's relationship to forests and conservation rather than so much detailed, technical information, and establishment of a comprehensive course to introduce students to forestry as a national economic problem.

11. Clarification of job sources, positional requirements, and future possibilities through contacts with representatives of various conservation agencies and members of commercial organizations.

12. Use of the probationary period to determine more conclusively the possession of the following characteristics, testing by groups or singly, and expression of results, in relative degree.

a. Reliability, judgment and common sense, executive ability, initiative, adaptability, persistence, and practicality.

b. Integrity, ethics, imagination, enthusiasm, mental curiosity, and intelligence.

c. Personality, congeniality, ability to get along with associates and outsiders (by types and classes), general appearance and impression created.

The investigations should be planned along informal lines and conclusions reached by measurements of results on jobs and reactions to actual situations, avoiding unsupportable impressions wherever possible.

d. A thorough, written digest of all results, including improvement or change.

Summarizing, the study has shown a lack of relation between Junior Forester examination grades and advancement of men in the Forest Service. It has shown that a high scholastic record, personality, work-business traits, and mental qualities are the most reliable indicators in measuring the future success of those men. It has disclosed a need for more complete personnel records, improved recruitment procedure, a broader scholastic training, a more selective Junior Forester examination, and an extension of career services.

JOHN H. SIEKER, a Senior member of the Society and formerly supervisor of the Shoshone National Forest, Wyoming, has been promoted to the position of assistant chief in the division of recreation and lands, U. S. Forest Service. Sieker received an appointment as forest ranger on the Washakie National Forest in Wyoming in 1926 and since then also has served on the Chippewa National Forest in Minnesota, the Black Hills National Forest in South Dakota, and as junior forester and assistant supervisor of the Harney National Forest in South Dakota. He was named supervisor of the Shoshone National Forest in 1936. He is a graduate of the Yale School of Forestry.

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Several correspondents are seeking these back numbers. Those having them for sale are requested to write to the Business Manager at Washington.

MULTIPLE AND OPTIMUM USE OF WILD LAND UNDER DIFFERENT ECONOMIC CONDITIONS[1]

By SIEGFRIED VON CIRIACY-WANTRUP
University of California

Dr. von Ciriacy-Wantrup was formerly a member of the faculty of the University of Bonn. For the past several years he has held a travelling fellowship under the Rockefeller Foundation. He has recently joined the staff of the Giannini Foundation of Agricultural Economics. Dr. von Ciriacy-Wantrup has had a splendid opportunity to observe American land use problems. He is thoroughly conversant with the land use problems of Central Europe. His discussion of multiple and optimum use of wild lands under different economic conditions will be of interest to every forester in America.

THE concept of "multiple use" has become the guiding principle in the administration and utilization of the National Forests in the United States. An analysis of its meaning and of its applicability under different economic conditions might reveal its usefulness as a principle for governmental policies dealing with all the "wild land" of the nation. Wild land is here construed to include all nonagricultural, nonurban land areas not in use for residences, transportation, or industrial plants.

Multiple use of wild land, for instance of forests, might mean two different things: first, the administration or management of several uses of wild land by a single agency, and, second, the use of a single unit (acre) of wild land for several purposes. The distinction between these two meanings is often not fully recognized.

In the first case, the principle of multiple use in the sense of unity of administration and management is doubtless sound. The natural differences between different units of wild land not only within the country or a state but also within smaller administrative districts, for instance within those of a forest supervisor or even a forest ranger, are so great that multiple use should always be a matter of principle in wild land policies. The overhead costs for the administration or management of wild land would become prohibitive if the attempt were made to set up separate organizations for each of the several uses.

In the second case the principle of multiple use may be wholly unsound. Although several uses of wild land can be administered jointly with advantages in overhead costs, they are not joint products in the economic sense.[2] On a single unit of land some uses are complementary or supplementary under certain economic conditions, but more often they are competitive.[3] The economies realized by utilizing overhead costs more fully are, therefore, not the decisive factor for the combination of several uses on the same land. The total social production from the use of one specific acre may be smaller from several uses than from a few or from a

[1]Paper No. 68. The Giannini Foundation of Agricultural Economics.

[2]Joint products may be defined to exist where the increase or decrease in the production of one product increases or decreases the production of others or at least makes it more economical to do so.

[3]A rough comparison can be made to the oil industry. Insofar as the supply of gasoline is increased by refining more crude petroleum, the more gasoline is made, the more heavy oil will also be produced. But insofar as the supply of gasoline is increased by the "cracking" process, the more gasoline extracted, the less the yield of heavy oils. Compare: J. M. Clark: Studies in the economics of overhead costs. Chicago. 1923. p. 98.

single use. In other words, some or all of the minor (subordinate) uses may subtract more from the major (dominant or codominant) use or uses than they add to the total product. If, therefore, the use of one specific acre of wild land is under consideration, the concept of "optimum use" is more applicable than that of multiple use.

Under the concept of optimum use there may be several uses. The idea, however, is not to have several uses always but to permit them if they are socially desirable. In many cases the optimum use will be a single use rather than some combination of several uses. In other cases it will be one dominant use and as many subordinate uses as do not interfere with the dominant use. In a few cases there may be two or more codominant uses of nearly equal importance.

In the history of the wild-land policies in the United States, the principle of multiple use—in the first sense—has served a very good purpose. As already stated this is particularly true for the administration of the National Forests. Three reasons may be mentioned:

In the beginning, there was considerable opposition from vested interests against the establishment of National Forests. It was felt that the establishment of National Forests meant the end of the profitable exploitation of public property. Local governments also feared a decrease of taxable incomes from the lumber and grazing industries. The Forest Service acted wisely by indicating through the emphasis of multiple use that the exclusion of grazing and timber cutting from the National Forests would not be attempted.

Secondly, the one-sided "mining" of privately-owned timber led to disastrous consequences for forest uses which were subordinate from the entrepreneurial standpoint but which were highly important from the standpoint of society. These uses were particularly watershed protection and recreation. The multiple-use principle was useful in the efforts of the Forest Service to educate the lumber industry and the public to the fact that timber was not the only use of the forest.

Thirdly, the great differences in the natural and economic conditions in different parts of the great country brought about a desire for the most flexible principle in policy and administration. Such a principle was the principle of multiple use.

The proved usefulness of the concept of multiple use in the sense of a coordinating administration of several land uses by one agency should not lead to applying it to conditions under which the concept of optimum use might be more useful. Economic conditions and social needs change and with them the optimum combination of land uses. Principles of land utilization, therefore, cannot be tied to that combination of uses which includes several or all uses physically possible on an acre of land. The optimum combination of uses excludes subordinate uses if their damage to the dominant use or uses is larger than their own return.

To illustrate this we might point to the long and diversified history of wild lands in older countries. It has been the European experience that the various land uses conflicted with each other to some extent and that it was therefore necessary to curtail some uses and to eliminate others in order to obtain the optimum combination of uses. In fact, wild-land policies to a large extent consisted in attempts to eliminate uses which at one time had been dominant ones in an optimum combination of uses but which could no longer be tolerated after economic conditions had changed. The multiple-use concept did not become the guiding principle for wild-land policies in Europe because not multiple use as such, but the optimum combination of uses seemed to be important.

Until the end of the Middle Ages, and in some parts of Europe until the beginning of the 19th century, the production

of animal feed and of manure was the dominant use made of wild lands. Communal pastures and forests were grazed. Litter and leaves were taken from the forests and used as feed or as bedding for animals. Hogs were fattened from oak and beech seeds. The latter use excluded, of course, any cutting of the "crop" trees. The grazing, the collection of litter, and the stripping of leaves also interfered seriously with the other uses, for instance with recreation and timber production. The fight between the peasants and feudal lords whether pasture, mast, and forest litter or hunting and timber should be the dominant use of wild land runs through the medieval history of all European countries. During the 18th and 19th centuries it was overshadowed by the economic conflict between feed and timber production and in some limited areas by the exclusive requirements of watershed protection. Today timber production has become the dominant use. Feed production from wild land has been almost excluded. Hunting and other recreational uses are tolerated as subordinate uses. Where the emphasis on hunting leads to such an over-stocking with game that the dominant timber use is endangered, for instance in parts of Germany, the costs of protecting the growth of timber against the damage by game are paid by the hunters under government regulation. The increased economic importance of watershed protection in view of the increased investment in water reservoirs or power plants and the increased intensity of agriculture in the river valleys has, in limited areas, brought about restrictions of most other uses.

In the light of the historical changes which have taken place in the combination of wild-land uses in Europe, the analysis may proceed to consider the broad economic tendencies which are affecting and will affect the optimum combination of wild land uses in the United States. We shall include only the most important uses, namely grazing, lumbering, watershed protection, and recreation.

Grazing of wild lands will always remain the dominant use of that part of the United States in which the inherent characteristics of the land exclude or restrict other uses. The western range properly handled will remain an important resource of the country. This cannot obscure the fact, however, that grazing is definitely on the defensive where it competes for the land with other uses. The economic conditions for the grazing industry are changing.

The United States is approaching a stationary stage in the numbers of consumers. Beef consumption per capita has fallen fairly persistently from more than 67 pounds in the five-year period ending in 1914 to less than 50 pounds at present.[4] Inconsistencies in this definite, downward trend are due to the seventeen-year cattle cycle. Mutton consumption is of much less importance in the United States than beef consumption. It has fluctuated widely during the last thirty years. The pre-war level of 8 pounds per capita has not been reached again. Dietetic experts do not deem necessary an increased consumption of beef and mutton, not even in the low income and therefore low meat-consuming groups of the population. Qualitatively, the demand is shifting towards a young and highly finished type of beef (baby beef) which cannot be produced under average range conditions. The product of the range, that is "grass steers" and "feeders," has to compete with the finished product of the corn belt under the great handicap of transportation costs across half the continent. The costs of marketing a 1,100 pound steer are $3.85 for the

[4]National Resources Board. Agricultural land requirements and resources. Washington, 1935 p. 4.

producer in Illinois, $12.35 for the producer in Idaho, $10.67 in Montana, and $10.01 in Oklahoma. The comparable figures for a 70-pound lamb are $0.31 in Illinois, $1.20 in Idaho, $1.14 in Texas, and $0.99 in Montana.[5] The lower the price of the product in periods of depression, the more important does this fixed handicap become.

The grazing industry will be able to exist under these adverse circumstances only under one condition—cheap forage on the range. Cheap forage on the range requires low land values or low grazing fees on public land and unimpaired grazing capacity of the range. The present and future economic status of the grazing industry is dependent upon the cheapness and the productivity of the range. The competition between grazing and other land uses touches precisely on this point.

It has been pointed out frequently in recent years that the values of grazing lands are too high for the income level of the grazing industry.[6] Often losses can be avoided only by the opportunity of cheap or free grazing on public lands or momentarily by "mining" the range. The latter is particularly the case on leased lands. It is practiced on deeded lands also if the owner's equity is so small that not selling but "mining" the land is the most profitable procedure of liquidation from his private standpoint. In times of depression an owner may take recourse to depleting his land even if his equity in the land is high, because there is no other place for him to go.

Grazing fees on public land lower than a level established by competitive bidding, as done on private lands, amount to a subsidy by the public to certain groups of the population.[7] In some cases such a subsidy might be justified by social gains. In other cases such subsidies might only prevent the socially desirable change of the land use pattern. The "mining" of the range increases the costs of winter feeding and the losses from drought. Eventually it leads to the destruction of the economic basis on which the grazing industry is built. The grazing capacity of the western range has been reduced considerably, according to some estimates more than half, during the last fifty years.[8] A large proportion, probably up to three-fourths, of the range area is still on the downgrade and only 16 per cent—mostly in National Forests—is improving. Through the destruction of the range the forage becomes more expensive, which in turn increases the economic pressure to "mine" the land. Thus, a vicious circle is established.

Land values out of line with the economic situation of the grazing industry are partly caused through competition for

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[5]The western range. Senate Document No. 199. Washington, 1936. p. 413. For the five-year period 1924-29.

[6]Compare for instance:

The western range. op. cit. pp. 193-211 and pp. 400-407.

The economics of range sheep production in Montana. Montana Agr. Exp. Sta. Bull. 300. Bozeman. 1935. p. 12.

Cost of producing beef on the ranges of western Oregon. Oregon Agr. Exp. Sta. Bull. 223. Corvallis. 1925. pp. 17-22.

Cost of producing mutton and wool on eastern Oregon ranges. Oregon Agr. Exp. Sta. Bull. 219. Corvallis. 1925. p. 7.

[7]The income of the National Forest Service from grazing between 1925-1929 when relatively good prices for animal products prevailed was 1.65 million dollars per year. The direct costs of the Forest Service for the regulation of grazing were 1.45 million dollars. If one would charge grazing with its share of protective and overhead costs of the Forest Service, nothing would be left to compensate for the depletion of the vegetative cover.

[8]The western range. op. cit. p. 8.

the range within the industry itself. A range unit, similar to most farms, is not valued from the standpoint of possible profits alone but also as the basis for a home and as the guarantee of steady, independent employment. However, competition with other land uses is becoming increasingly more important. Agricultural uses have crowded out grazing, particularly out of the Great Plains and the great valleys of the West, for decades. The grazing in the National Forests has decreased (in cow units, 1914 = 100) from 125 in 1918 to 84 in 1933.[9] This decrease was accomplished partly by artificial control through grazing permits and partly by the natural competition of new and vigorous forest growth which followed in the wake of better fire protection. On other areas, watershed protection and recreation are competing with grazing for the land. Many communities of the West are buying up large areas of range land in order to safeguard their water supply. "Dude" ranches are replacing cattle and sheep ranches. Game refuges and hunting estates restrict grazing. National and state parks have been established in which grazing is entirely excluded.

There can be no doubt that the United States will eventually adopt the same principle in its wild-land policies which all older countries have adopted, namely that grazing if it competes with other land uses has to yield to timber use, recreation, and watershed protection. Grazing will become more and more a subordinate use on large parts of the wild land area. Where grazing does not compete with other uses, no objection against grazing can be raised—as already stated.

In modern times timber production has become the dominant use of wild lands in many countries. The relation of the present drain of timber to new growth in the forests of the United States might be interpreted in favor of an emphasis upon timber in wild-land policies. In saw timber and cordwood combined, the annual drain during the pre-depression period 1925-1929 was about twice as large as the annual growth; for saw timber alone, it was about five times as large.

These relationships between drain and growth give a somewhat pessimistic picture of the true situation. In the first place, it seems unlikely that the lumber consumption between 1925-1929 represents the normal for the United States. Per capita lumber consumption reached its peak between 1900 and 1910, after a phenomenal rise in the second part of the 19th century.[10] From there on, it decreased rapidly. At present it amounts to only one-fourth of the peak figure. An analysis of this drop shows that the most important decline was in construction. Within construction, by far the most important decline was in rural construction. In 1912, of twenty-nine billion board feet used for construction, fifteen billion alone were used for rural construction, nine billion for urban residential, and five billion for urban nonresidential construction.[11] By 1928, rural construction had declined to five billion; urban residential had risen to twelve billion; and urban nonresidential had remained stationary.

Because of the boom in urban residential building, the lumber consumption for this purpose in 1928 cannot be regarded as normal for the future. Under some conditions lumber does not give sufficient safety against fire and does not have the technical qualities for the construction of large cities. In the case of fuel, a further decline of wood consumption can be

[9]National Resources Board, op. cit. p. 36.

[10]United States Forest Service. Lumber distribution and consumption, 1934. Washington, 1936. pp. 5 and 6. (Mimeo.)

[11]National Resources Board. Forest land resources, requirements, problems, and policy. Washington, 1935. pp. 7-15.

expected, not only because wood is more expensive but because oil, gas, and electricity have so many technical advantages for city use. The lumber requirements for the transportation system are likely to decline because of the preservative treatment of ties, steel railroad cars, the all-steel-bodied automobiles and busses, concrete roads, and aluminum airplanes. Here also the main point of consideration is not the price of timber but its technical qualities. The increased use of veneers and plywood helps to economize high-grade lumber in the furniture and other industries. On the other hand, technical development has opened up a great new market for forest products in the form of pulp, cellulose, and other chemical uses. However, in predicting a revolution in the demand for wood from this side, one should always bear in mind that cellulose production allows great economizing in area because of the much shorter rotation, the much smaller waste, lower requirement for lumber quality, and the constantly increasing number of species for which cellulose processes are being developed.

In general, the picture of the future drain on forest resources has to be viewed against the background of population trends in the United States. These are characterized by strong tendencies towards a stable if not declining population, towards urbanization, and towards prohibition of further immigration. These structural changes combined with the technical development seem to be as important for the great decline in lumber consumption as the increased prices of lumber in comparison with other commodities.[12]

The prices of lumber rose considerably in comparison with all other commodities during the second part of the 19th century without checking the strong increase in lumber consumption. The decrease in lumber consumption started when the pioneer period in rural construction and transportation had definitely come to an end in the first decade of the 20th century. The reversal of trend in lumber consumption took place in the period from 1905 to 1915 without changes in the long-time trend of the price relationship between lumber and other commodities. The decline of lumber consumption seems to be more a symptom of the fact that America has come of age than the effect of an accentuated scarcity of lumber. One might expect, therefore, a pattern of lumber consumption in the United States not on the level of the latter twenties but considerably below that figure on the level of old countries with abundant lumber supply and an active lumber industry as, for instance, Sweden and Norway. On the basis of the consumption in these countries and of present consumption trends in the United States, wood consumption in the United States might be estimated to settle at around 100 to 120 cubic feet per capita.

On the basis of this estimate of the future consumption of wood and on the basis of an average growth rate of 40-45 cubic feet per acre, which fortunately can be obtained on some 350,000,000 acres of forest land in the United States without intensive forest management in the European sense, a timber shortage due to lack of growing stock is not likely. The possibilities of intensive forest management on at least 50,000,000 acres, included in the 350,000,000 acres, and the growth on at least 100,000,000 more acres under mere protection, not included in the above acreage, afford an ample reserve.

Some temporary frictions in the supply-demand relationship may arise out of the unequal distribution of the growing stock

[12]Warren, G. F., and F. A. Pearson. Wholesale prices for 213 years, 1720-1932. Cornell Agr. Exp. Sta. Memoir No. 142. Ithaca, 1932; and United States Department of Labor, Bureau of Labor Statistics. Wholesale prices in the United States.

between the different age classes. Because the first thorough forest survey covering the United States is not yet completed, no definite figures can be given. At the present time a large proportion of the total lumber supply still comes from the exploitation of old virgin stands. This situation might last for another fifteen or twenty years. On the other hand, there is a large supply of young, immature growing stock which would insure an ample supply of timber in forty or fifty years from now and from then on, if protected in the meantime and then harvested on a basis of sustained yield. As long as large virgin reserves are available in the Pacific Northwest, which are under strong economic pressure to be liquidated because of high fixed costs, sustained yield management on a commercial basis will be restricted to a very limited area. After the virgin stands are exhausted, a temporary shortage of timber compared with present supply and prices is not impossible. This shortage will last until the present young growth has come into marketable age on large areas.

Under these circumstances it seems to be the best forest policy on government lands to attempt the timing of timber cuts so as to ease the friction which will arise when the private virgin timber has been exhausted. Timber cutting from all public lands, including state and Indian lands, approaches 3,000,000,000 feet. This timber is cut almost entirely in the West and represents a noticeable percentage of all western timber. It should be kept in mind, however, that most government timber consists of overmature age classes. On the other hand, a large part of government timber is not marketable at all under present price relationships because it is too inaccessible. Increased sales of government timber at a later period might be of great benefit to the country and to the lumber industry itself because a very fast rise of timber prices after the exhaustion of private virgin timber is undesirable both from the standpoint of the consumer and of the lumber industry. Such a forest policy of the government would at present mean mainly timber conservation with the exception of overmature stands and of so-called salvage cuts.

In addition, a policy of acquiring for the National Forests not only exploited forest land with more or less young growth but also some areas with mature timber stands, particularly in periods of depression, would relieve the pressure to liquidate in private forests and would help private owners to reorganize their remaining holdings on a sustained yield basis. At the same time it would be a profitable investment for the public and would in many cases bring about a better distribution of age classes within the National Forests. Such a timber-storing policy would be confined to the western part of the country because only here large stands of virgin timber are still in existence. In the rest of the country, government policy is already directed towards protection and towards building up the growing stock. Thus, from the economic standpoint, at least during the next decades, not timber utilization but timber conservation and protection might be set as a goal for forest policies on public lands. This, of course, has nothing to do with banning timber cutting altogether or with changing the National Forests into National Parks.

Whether in a generation from now timber utilization will become dominant on all wild lands suitable for forests cannot be said with certainty at the present time. Much depends on the inventory of growing stock which is just being taken. Furthermore, it depends on the development of the third major use of wild lands, which is very likely to become the dominant use in large parts of the country, that is, on recreation.

Nearly all tendencies noted above which discounted the importance of grazing and timber harvesting within the future pattern of wild-land uses point toward an

increasing importance of recreation. Smaller families, increased urbanization, faster and cheaper transportation facilities independent from railroads, shorter working hours but work resulting more in nervous than in physical fatigue increase the demand for outdoor recreation. To balance the more and more complicated and unnatural life in overcrowded cities, the recreational demand tends more and more to the simple, natural forms in less crowded parts of the country. Answers by the public to questionnaires of the National Forest Service and the National Park Service illustrate these tendencies toward the simple and the natural. This does not seem merely a passing fashion but an urgent biological need for all people coming from northern European stock. It has become stronger and stronger in northern Europe since the middle of the 19th century with the increase in urbanization.

The demand for isolation combined with the increasing proportion of city population in the total population requires larger and larger areas for recreation. Visitors to National Parks and Forests increased about tenfold during the last decade. The National Parks are by far too limited to satisfy this demand. The Forest Service has recognized this by planning to set aside under the designations of "superlative areas" (three million acres), "primeval areas" (nine million acres), "wilderness areas" (ten million acres), and other designations, forty-five million acres. The idea of setting aside certain areas where recreation will be the dominant use might well be considered. Whether the total area is sufficient, is a debatable question in view of the fact that recreational facilities on private lands are constantly reduced. At the present time only one-fourth of the planned area has been withdrawn from other uses.

Another approach to satisfying the urgent demand for recreation would be to harvest the timber in such a way that recreation would not be interfered with. This can be done by selective cutting, by group selection, or by clear cutting and quick reforestation, sustained yield management being taken for granted. There can be no doubt that a vigorously growing young forest has great aesthetic values, although different from an old stand of virgin timber. A young stand also has great advantages for wildlife. European experience shows that intensive forestry and dominant timber use can be combined with recreation and hunting. From the technical standpoint, forest management as practiced in Europe is possible in most parts of the United States. From the economic standpoint, however, such practices are still restricted to limited areas. It seems to be more economical to hasten the natural development towards more intensive forestry by a timber-storing policy on public lands, education, and a proper tax system than to offer government timber on the market and at the same time to induce intensive forest practices through subsidies. Thus the same conclusion as to a timber conservation policy is reached from the standpoint of recreation as was reached above from the standpoint of timber supply and demand.

The argument for conservation in the interest of recreation is strengthened by the increasing demand for watershed protection, which has the same conservational requirements. The importance of watershed protection in the interest of flood control, city water supply, irrigation, and public health has often been discussed. We might, however, take a look into the not so far distant future when the oil, gas, and coal resources of the nation will be exhausted. Then solar energy in the form of streaming water will become the most important source of energy. Its protection and control should in all cases be entrusted to the government.

There is one other important reason why the demand for outdoor recreation should not only be satisfied in every way possible by government agencies in pref-

erence to other uses of wild lands, but should be actively stimulated and directed through education. Outdoor recreation is the only conscious use the city population makes of the wild lands of the nation. Only through its effect on recreation can the city population grasp the importance of a far-sighted land conservation legislation. Since the political support of the city population is essential for such legislation, it would seem justifiable to facilitate recreation even through means which do not appeal to the wilderness enthusiast. Fast highways which would bring the city population into hiking or riding distance of recreational areas should be built, but they should be regarded more as service roads, as means to an end, not as purely scenic roads which in themselves could represent all the recreational values. Some more elaborate camps, cabins, and improvements seem justified in certain areas but a charge covering their cost might be made.

A part of the city population needs to be broken in before nature in its primeval state can be enjoyed. The main emphasis should be placed, therefore, on a system of hiking and riding trails. An extensive marking of trails with symbols on trees, not with lettered boards, might be suggested. It would help to induce the city population to leave their automobiles. It would teach them to rely more on their own path-finding instincts. It would make the wilderness safe without detracting from its untouched beauties. Once such a trail-marking system is established, it would help to economize public expenses for trail upkeep greatly. In short, it is not sufficient to offer wilderness areas to the city population. In addition, the city population must be educated, as far as possible indirectly, how to use them, otherwise the very thing which is to be enjoyed is destroyed. That there should remain untouched areas for the especially experienced recreationist and for ecological research, might be mentioned.

The people of the United States are willing to pay for their outdoor recreation. The rapidly increasing and profitable tourist business in this country and Canada shows this strikingly. The income to Canada from tourists chiefly from the United States amounted to $200,000,000 in 1935 and is still increasing. In the United States the tourist business has resulted in bringing a market to previously unmarketable agricultural products and in revolutionizing the whole land value structure of rural districts. It might well be considered how this willingness to pay can be directed to conserve the very foundation on which outdoor recreation is built rather than to have this willingness exploited by private or local interests. How that can best be done, either by government participation or government regulation and taxation, cannot be discussed here. It might be mentioned that many resorts in Europe are under government management and most of them are operated under government regulation. The people have been well satisfied with the administration of recreation as a public utility.

In summarizing it might be said that regardless of the permanent validity of the multiple use principle, in the sense of the unified administration of several or all uses of wild land by a single agency, the optimum combination of uses on a single unit (acre) of land is changing in the United States in the same direction as it has changed before in Europe. The necessity of making constantly new combinations of uses in view of changing economic conditions invalidates the multiple use principle, in the sense of the desirability of several or all uses on the same acre of wild land, because the optimum use might require a single use or at least the exclusion of several subordinate uses in favor of the dominant use or uses. Thus, economic conditions in the United States tend to place grazing more and

more in the class of subordinate uses in considerable parts of the wild land area. On the other hand, there are strong economic and social forces which are working in the direction of making recreation the dominant use on wild lands in general and on public lands in particular. Eventually timber use will become at least a codominant use, but during the next two decades a policy of timber conservation and timber storing on public lands would not only serve best the purposes of recreation but might be defended on economic grounds as the best timber policy as well. The economic needs for watershed protection point in the same direction. In cases, therefore, where there is any uncertainty as to the damage done to the prospective dominant and codominant uses by subordinate uses, recreation should be given the benefit of the doubt in governmental wild-land policies.

Tribute to a French Forester

ROGER DUCAMP, retired French forest conservator, a friend of several American foresters, died at Nimes, France, on March 1, 1938, aged 77 years.

This fine French forester, then Lieut. Colonel, was known to many officers of the 10th and 20th Engineers during A.E.F. days. Energetic, decisive, and picturesque, and speaking English fluently, he liked us American foresters and Gallic-like did not hesitate to show that friendship. Ducamp had a wide and varied forestry career. He organized and was director for years of the French Forest Service in Indo-China, did forestry work and traveled in Corsica, Algeria, and Spain, and became an authority on semi-desert forestry on which he wrote voluminously. It was my good fortune to have known Roger Ducamp during A.E.F. days and later, and his letters were always stimulating, friendly, and welcome. He was a true forester, a charming gentleman, and a fine friend.—Jno. D. Guthrie, *Civilian Conservation Corps.*

International Forest Fire Control

COOPERATION in forest fire prevention between the Province of Quebec and the State of Maine is an important factor in the control of fire in those areas. Forest fires know no international boundaries, and on both sides of the border forest authorities unite their forces to combat this common enemy.

Forest fire lookouts on both sides of the international boundary between Quebec and Maine have been connected by telephone since 1916. Since 1931 conferences dealing with forest fire problems have been held between the fire wardens of Quebec and the Commissioner of the State of Maine and his deputies, which have resulted in the present cooperation.

AUSTRIAN YOUTH AT WORK

By JOHN D. GUTHRIE
Civilian Conservation Corps

During the past five years the JOURNAL has carried several articles on our C.C.C. and one on the German *Arbeitsdienst*. Below is another on a European youth labor service, the Austrian, which differs radically from the German model and somewhat from the American. The author offers several comparisons of the Austrian with the American and suggests that in several particulars we might well follow the European examples. The recent debacle in Austria gives a note of timeliness to this article.

THE concrete idea of using youth for work in the forests apparently originated with a college professor at Heidelberg about 1910. About the same time a Harvard professor of psychology, William James (6), expressed a similar idea advancing it as a "moral equivalent of war." Then in 1915 was published George H. Maxwell's book *Our National Defense* (7), which was an amplification of James' idea. However, it remained for Bulgaria to put this idea into practice in 1921 when that country began a compulsory youth service to repair roads damaged by war. Later in 1925, Germany actually started youth camps in Upper Silesia. Switzerland early had her *Freiwilliger Arbeitsdienst*. The idea was later followed in different forms by several European countries: Germany, Italy, France, Sweden, England, Austria, and now Norway is planning an *Arbeids-Tjeneste*. Holland (5) states that about 15 countries have tried the youth labor camps and already over four million men and women have spent some time in them. Our own Civilian Conservation Corps began in 1933. Many articles on our C.C.C. have appeared and some of the European youth labor services have already been written up. Holland had a general article, while Ringland (9) covered Germany, and Guthrie (3, 4) published notes on the English and the French systems. Silcox (10) has written authoritatively of our own C.C.C.

THE AUSTRIAN ARBEITSDIENST (1, 2)

While in Austria in September 1936, I had an opportunity to confer with Dr. Karl Messner (8), then head of the Austrian *Arbeitsdienst*, and to see something of their youth camps. The Austrian type of organization and manner of handling camps and work offer several points of interest and value to Americans. First, it may be stated that the Austrian youth work began in a small way in June 1933, only about two months after our C.C.C. started. The total number of youths employed has varied as with us depending on federal appropriations. The camps are under the Austrian Labor Service and are handled entirely by civilians; the army never has been connected with them in any way whatever. This is in striking contrast to the German and Italian plans as well as to ours.

In September 1936, there was a total of only 4,700 men in C.C.C. camps in all Austria although they have had as many as 15,000 at one time and hope and plan to bring their organization again up to that strength. This number may seem small to us, but in proportion to Austria's and our own populations, it is about the same percentage as our 300,000. Their corps was continued through 1937; what changes the recent political upheaval may have on the camps no one can say definitely now, though Germany strongly favors the principle of the compulsory *arbeitdienst*.

General.—The Austrian age limits are from 16 to 24 years inclusive though the majority of men are actually under 21, as with us. I was interested particularly in their experience with boys of 16 and was told that it had been very satisfactory indeed; while the boys at this age had to be broken in a little more carefully, they did very good work.

Enrollments are voluntary for a maximum period of 40 weeks. However, 25 per cent of the camp strength may remain indefinitely. An enrollee voluntarily discharged at the end of 40 weeks may reenroll after two years and there is no minimum period of service. Enrollees receive 50 *gröschen* (about 10 cents) a day and in addition are furnished 10 cigarettes daily. They are, of course, clothed, sheltered, and fed. As in our C.C.C. they are required to send home most of what seems to us pitifully small pay; this is done, however, by the boys themselves and not by the Army as in our Corps.

The men are required to put in six hours of actual work each day for six days a week (instead of five in our C.C.C.) and an additional two hours are required to be devoted to study or education and to sports or recreation. This time is about equally divided between education and sports, and both are compulsory.

Kinds of Work and Costs.—The Austrians' general rule is that their C.C.C. shall be used only on work projects of public benefit and only on projects or classes of work which could not be expected to be performed by ordinary adult laborers or where ordinary labor is not immediately available. In actual practice this means that the C.C.C. is not engaged on projects in or near towns or cities, but is mostly confined to projects back in the mountains or away from settlements. "Accessible" largely means work or projects which can be reached *on foot* since the men are not transported by trucks. As compared with our camps, there is a minimum number of trucks or machinery of any kind. The types of work done are somewhat like ours. We saw groups of boys putting in a small fish hatchery up in the high mountains, cleaning out and rocking drainage ditches along roads, and doing mountain trail work. They also do planting, gather seed and prepare small nurseries, build and repair trails, do some timber stand improvement work, soil improvement, and the camps in the high mountains during the winter are engaged mostly in keeping the roads cleared of snow. One very interesting and suggestive job which the men do is the building of log slides or chutes during the summer on state or city forests for use by the foresters or contractors in winter logging where such slides are necessary in connection with the driving and hauling of mature timber out of isolated or rough forested areas. In Vienna there are special youth groups known as "Youth Service" where trades are taught; here also there are group training and work for young girls.

The Austrians figure that it costs 3½ shillings (70 to 75 cents) per day, per enrollee. This cost is overall—pay to enrollees, food, clothes, shelter, tools, and overhead. This is something for us to shoot at, with our estimated costs per enrollee running from $5 to $6 per day. Food is simple, nourishing, but cheap. Camp buildings are extremely simple, rustic but livable. There is only one truck for each camp, and there is no expensive road and other machinery—it is all hand labor. They follow the excellent rule that the owner of the land on which the work is done must pay approximately 1/3 of the cost (later increased to one-half). This is required whether the landowner is a federal, state, city, commune or private owner and as a result, not much work has been done on private lands. We might well consider adopting some such rule.

Camps and Camp Organization.—The number of men in each camp varies wit

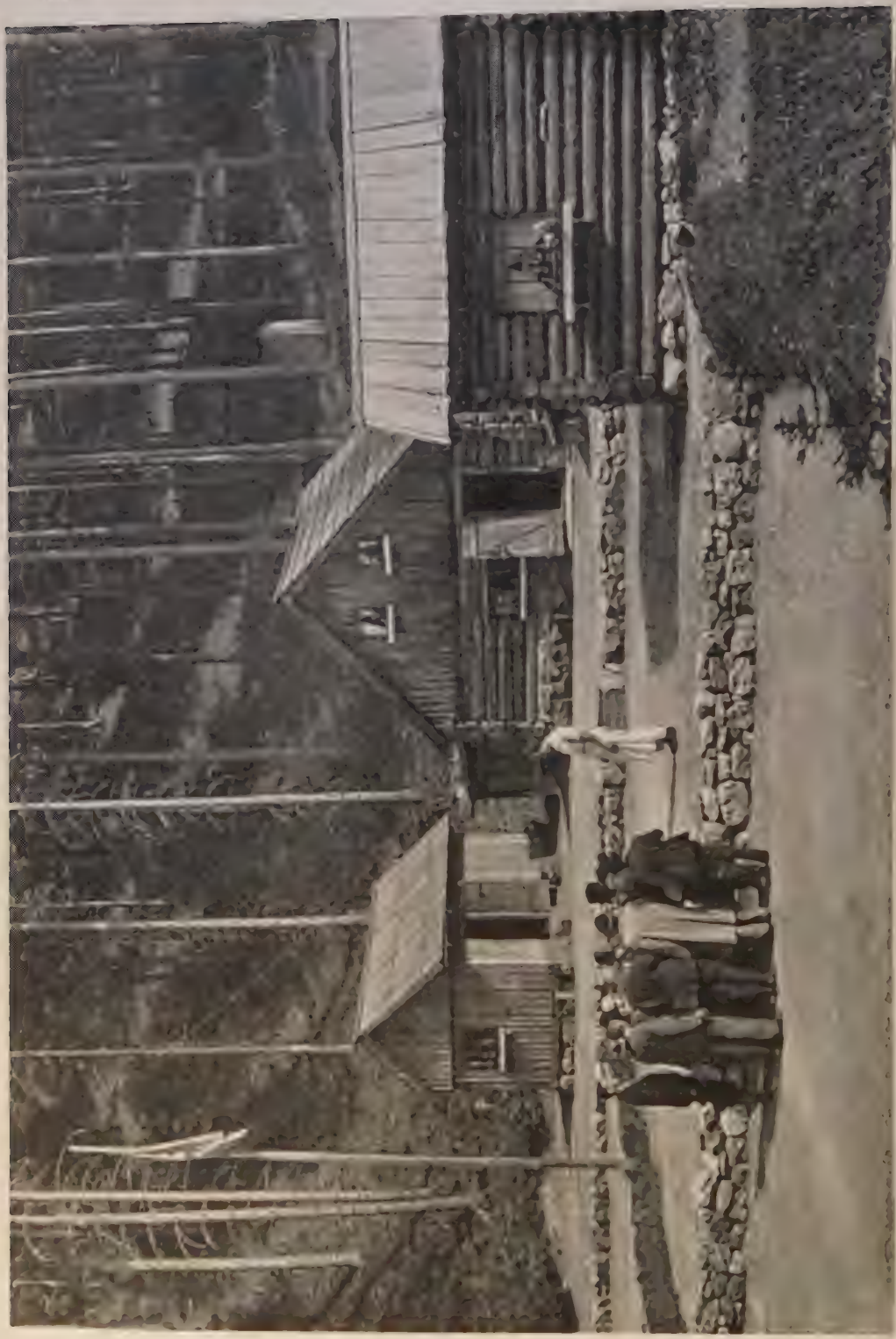
the location of the camp and the amount of available work accessible from a particular location. In actual practice this means that their camp strengths run from 50 to 300 though they have had one camp as large as 600 men. Their experience is that they have the best results with camps with a strength of 40 to 50 men. In September 1936, they had 100 camps with a total strength of 4,700 men. One man, the camp leader, or superintendent we would call him, has entire charge of the camp and the work. He is directly responsible to the local office of the Labor Service and finally to the Central Labor Office in Vienna. His deputy is his business manager or camp manager, whose duty is to order food and other supplies, run the camp, and look out for sanitation. In the larger camps, the deputy has an assistant (a service leader, really a clerk) who handles all reports, and clerical work.

There are a very few older men in each camp. These correspond roughly to our foremen as they are skilled in some particular line, having been trained as enrollees. They have two kinds of leaders (the word "leader" is used here more in our foreman sense)—experts or technicians, and leaders and sub-leaders selected from the enrollees who have been promoted. They find that the best practice is to have a sub-leader for each group of 10 to 12 men.

And here is another interesting point: The future leaders and sub-leaders are chosen from among the camp members or enrollees on the basis of their qualifications after they have taken a required course in the school for leaders. Depending on their qualifications, they receive a certificate for promotion or higher grade, being graded and classified as "leaders" or "sub-leaders." Leaders and sub-leaders may remain in the work indefinitely. Another sensible rule: The entire camp overhead cannot exceed 10 per cent of the total camp strength.

In a camp of 150 men, there are usually two trained cooks and two kitchen police, coming from the enrollees. The kitchen force receives slightly higher pay depending on their duties and length of service The food is to our minds extremely simple. For example, I was in a camp kitchen and saw the evening or main meal being prepared. It consisted of a large caldron of cornmeal mush which was to be served with bacon, plenty of good crisp Vienna bread, plenty of milk, and to wind up with stewed fruit. Our C.C.C. boys would probably have "mutinied" over such a meal! And yet this food had nutritive value; the fine, healthy and smiling boys we saw at work were certainly good advertisements for this simple menu which made one wonder if our own C.C.C. enrollees aren't too much coddled?

In actual practice the camp leader spends practically all of his time on the projects, that is out of camp, his deputy or camp assistant looking after the details of the camp itself. Where it is a forest camp (and most of their camps are forest camps), the plans of the work to be done and later checking up or inspection are done by foresters or game experts or entomologists from the permanent and local forest organization. On some of the larger projects experts from the local or Central Labor Office take charge of the work, but have no responsibilities as far as the camp itself is concerned. Comparing this with our setup, it would mean that for a national forest camp, the local ranger or junior forester would lay out the work for the C.C.C. camp and would check this up from time to time as to satisfactory performance as well as instructing the leaders themselves in any technical phases of the work being carried on. By and large, the technicians, if any in a camp itself, are kept to a minimum, this function being performed by the local or regular forest force. In other words, the regular force supplies the technicians and pays their salaries. In these



the days of camp and appropriation reduc-
of ions, here is food for thought for us, with
tic ur large and expensive overheads.
me: *Discipline, Education, Recreation, and*
60 *ealth.*—Discipline is secured much in the
ca same manner as with us. For example,
en or infractions of camp rules, there may
wi e a small fine or a cancellation of leave
me rivileges or in serious cases, a dismissal
ca rom camp. I was told that at the start
Or he Austrians used military discipline but
te very shortly abandoned it for a policy of
cl persuasion which they have found to work
d out very satisfactorily.

t In the smaller camps the camp leader
tr or his assistant is responsible for both education or study as well as for recreation or sport. In the larger camps there is an experienced teacher and also a man trained in sports. Leisure time of the enrollees is used for policing the camp and grounds and also for mental and physical recreation. As remarked before, two hours each day are devoted equally to study and sports, both kept practical, and this time is not interchangeable.

Each camp receives a special library service—what we would call a traveling library. Every camp has a complete first-aid kit. There is no camp doctor but each camp has an enrollee (or leader or subleader) especially trained in first-aid. Each camp is visited periodically by a local doctor who examines enrollees feeling unwell and also looks out for camp sanitation. If a man is really sick, or in case of an accident or injury, he is immediately sent to a nearby hospital. In case of slight sickness, the enrollee is isolated in a special room in the camp, which is required by law. In larger camps, a local physician makes daily visits. Here is an interesting point and totally different from our practice, and that is that every enrollee is required by law to carry sick and accident insurance.

From what we saw of several groups of enrollees at work, they were strikingly like our own boys—young, husky chaps, good-natured, bareheaded, and stripped to the waist and brown as Indians.

A Small Camp Visited.—We spent a short time at a small camp on the watershed forest of the City of Vienna (Fig. 1). This was really a side camp containing 20 men who were working from a main camp further down the valley which had 60 men in summer and 40 in winter. The small camp has a few buildings, very simply constructed and located along the main highway. The sleeping quarters or barracks were very simple; the one inspected was used by 12 men with triple-deck bunks resembling somewhat an old-time logging bunkhouse except that this one was very orderly and spotlessly clean. The beds were all neatly made up, belongings were hung up on the walls, while the men's uniforms were hung in a rack or open clothes-press on the side of the room. Their so-called uniforms were khaki wool, simply made, with an emblem of crossed spades on the upper left sleeve. The kitchen was also rather small but spotlessly clean. At the time of our visit, there were only about two men in the camp—the cook and a company clerk or camp assistant. The absence of trucks, machinery, or elaborate tools was very noticeable in this small camp as well as the main camp further down the valley. The main camp was laid out as one of our camps would be, with several buildings and barracks, company street, and a flag.

Summary

The outstanding points in the Austrian C.C.C. which should be of interest and possible value to us are:

1. The organization has been handled entirely by civilians from the very beginning, in June 1933.

2. There is a very great flexibility as to size, company strengths and mobility of camps—running from 40 to 300 men depending solely on the amount and char-

acter of work accessible by foot from a camp.

3. The extreme simplicity and apparent effectiveness of the camp overhead which means a very low camp and per enrollee cost.

4. Enrollees are fed simply and cheaply and yet are husky and cheerful; no coddling of the boys.

5. Very low cost camp buildings which, however, seem to serve the purpose very acceptably; no large nor elaborate "recreation halls," no ping-pong tables nor pianos.

6. No work is done by the C.C.C. which can be expected to be done by older, regular laborers; therefore, no camps are in towns or cities.

7. No work is done on land whose owner does not pay at least one-third of the entire camp and work costs.

8. Absence of elaborate road and other expensive machinery, also absence of fleets of trucks. The Arbeitsdienst is designed to use unskilled hand labor.

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Virgin Port Orford Cedar Tract Reserved

ELEVEN hundred acres of virgin Port Orford cedar timber have been proclaimed a "Natural Area" by order of Chief Forester F. A. Silcox. This area lies within the Port Orford Cedar Experimental Forest in the Siskiyou National Forest, Oreg. The withdrawal was made in accordance with a regulation of the U. S. Department of Agriculture that typical examples of the principal forest types shall be reserved, untouched by man, for posterity to enjoy and study. The tract contains some splendid groups of this valuable and fast-disappearing species and is so located that it will be safe from inroads of fire and logging.

At the present rate of cutting, virgin tracts of Port Orford cedar will soon be a rarity except on federal lands within the National Forests. Only about 1,140 million board feet of this cedar remain in existence, all in southwestern Oregon except for a small amount in northern California. The annual cut averages about 48 million board feet.

A COMPARISON OF TWO METHODS OF YIELD TABLE CONSTRUCTION

By WILLIAM A. SYLVESTER

WITH A PREFATORY NOTE

By H. H. Chapman
Yale School of Forestry

One not an expert in forest mensuration might well assume that here at least is one field of forestry which because of its mathematical and statistical foundation would not be highly controversial. The following article and comments show that this is not true. Even those best qualified to express an opinion on the subject do not seem to agree on the best method to be used in the construction of yield tables.

PREFATORY NOTE

THE collection of sample plot data in even-aged old-field stands of loblolly pine in La Salle Parish, Louisiana, and Ashley County, Arkansas, has been under way by the Yale School of Forestry since 1917. A total of 240 plots is now available, up to and including the 70-year age class. Several of these plots have been remeasured once, and this process will be continued. On the basis of preliminary yield tables obtained from these data, the writer noted that the yield tables for cubic and board feet for this species in Miscellaneous Publication No. 50, U. S. Department of Agriculture, *Volume, Yield, and Stand Tables for Second Growth Southern Pines*, prepared by the office of Forest Experiment Stations, Forest Service, and Cooperating Agencies, bore no resemblance to the yields obtained in the above study except in the lower brackets. The curves of yields in the published tables diverged sharply upward and continued to ascend (Tables 62 and 63) to and including 80 years, while those of the local study tended to flatten off above 40 years, showing but slight net increase thereafter, in cubic feet, and only moderate increase in board feet.

Since one of the two localities included in the local study has the reputation of being about the best region for loblolly pine growth in the Mississippi Valley, it may fairly be assumed that the study, based on 240 plots, has more than a local significance. The yield tables published as standard in Bulletin 50 never have been checked or revised and are still accepted as indicating the probable yields of even-aged old-field stands grown without cultural treatment throughout the southern pine region. Yet on the basis of ten years of subsequent investigations, the evidence is cumulative that, for the region covered by the local study at least, plus errors in yields of cubic feet at 70 years run from 37 per cent for the 80-foot site class to 61 per cent for 110 feet, and in board feet (by the International ¼-inch rule) these plus errors run from 52 per cent for the 80-foot class to 62 per cent for 110 feet, diminishing proportionately for lower ages.

Since overestimates of growth are as serious in forest management as overestimates of standing timber are in sales transactions, it would seem that these yield tables for southern pine in Miscellaneous Publication No. 50 should be promptly revised, by proper statistical methods, and in the meantime withdrawn from circulation, especially as the accompanying yield tables for longleaf and shortleaf pine show similar tendencies. The apparent inaccuracy in these tables may lie either in the selection and size of plots in the field, or in whatever meth-

od was used in the office. Owing to the magnitude of the discrepancies shown, the writer has postponed calling attention to the situation, over a period of ten years, in order to accumulate further substantial evidence as to the existing yields of this species.

The study made by the co-author, William A. Sylvester, was intended to test the relative merits of the statistical method described by James G. Osborne and Francis X. Schumacher in the *Journal of Agricultural Research* 51:547-564, 1935, with the anamorphic graphic method which it was intended to replace. This comparison, based on what has been considered as adequate factual data in the form of plots, seems to indicate conclusively that increased accuracy is not attained by the statistical method, and that the labor of computation is from three to four times as great, as for the graphic method.

DURING the past few years statistical methods have come to play an increasingly prominent role in the field of forest mensuration. Statistical methods of constructing volume and yield tables have been presented as being more accurate than the customary anamorphic curve method of construction. The following study was undertaken in an attempt to compare a statistical method with the anamorphic curve method of constructing yield tables. The data used were based on 240 one-acre plots of loblolly pine. The data given in Miscellaneous Bulletin 50 of the United States Department of Agriculture were used for a comparison of results. The yield values in this publication have been questioned by some foresters since its publication in 1929. Yields secured by the statistical method in cubic feet and yields secured by the anamorphic curve method in board feet (International ¼-inch rule) show a great deviation from those given in Bulletin 50 and thus substantiate the doubt as to the accuracy of the yield values appearing in that bulletin.

The statistical method used by the writer is that given by Osborne and Schumacher.[1] The mechanics of the method are not discussed in this paper.

The values found for site index, stand per acre and yield per acre by use of the statistical method are given in Tables 1, 2, and 3. The results obtained by the statistical method compare favorably with those of the anamorphic curves. The biggest drawback to the statistical method is the length of time and work required to get results which are similar to those secured using the more simple method of anamorphic curves. The statistical method seemed to give less accurate results where the data were scarce, as in the younger age classes, than did the anamorphic curves. In both methods the accuracy of the final result depends on the trend of one or two curves. In the statistical method the curves of standard deviation and of coefficient of variation are all important, while in the anamorphic curve method the curve which corrects the anamorphic curves is important. With the data used, the curves of standard deviation and of coefficient of variation did not seem to have a definite trend. As a result of this, the final results can be inaccurate under a given set of conditions. The adjusting of these critical curves is a more serious problem in the statistical method.

The anamorphic curve method is preferred over the statistical method because

[1]Osborne, J. S. and F. X. Schumacher. The construction of normal-yield and stand tables for even aged timber stands. Jour. Agr. Research 51: 547-564. 1935.

TABLE 1

A COMPARISON OF THE SITE INDEX VALUES FOR AGES 30 TO 70 YEARS

Age	Site index							
	80		90		100		110	
	1	2	1	2	1	2	1	2
30	59	54	67	66	74	77	81	89
35	66	64	74	75	83	86	91	97
40	72	70	81	81	90	92	99	103
45	76	76	86	87	95	97	105	107
50	80	80	90	90	100	100	110	110
55	83	83	93	93	104	103	114	112
60	85	86	96	96	107	105	118	114
65	87	88	98	98	109	106	120	115
70	89	91	100	100	112	108	122	116

The values given represent height in feet.

The figures under the columns marked 1 were taken from Table 33 of Bulletin 50.

The figures under the columns marked 2 were computed by the statistical method.

The discrepancies in the 110 class are believed to be the result of insufficient data.

TABLE 2

COMPARISON OF THE STAND PER ACRE 4 INCHES AND UP

Age	Site index							
	80		90		100		110	
	1	2	1	2	1	2	1	2
30	510	450	420	370	375	250	335	190
35	415	340	345	270	300	200	270	170
40	345	260	290	215	255	179	225	158
45	295	215	250	189	215	166	195	153
50	255	199	220	177	190	158	170	147
55	230	191	195	171	170	152	155	141
60	210	188	180	168	155	150	140	139
65	195	183	160	166	145	148	125	138
70	185	183	150	166	135	148	120	128

The figures represent the number of trees per acre.

The figures under the columns marked 1 were obtained from Table 36 of Bulletin 50.

The figures under columns marked 2 were obtained from the statistical method.

TABLE 3

COMPARISON OF VOLUMES IN TERMS OF PEELED CUBIC FEET 4 INCHES AND UP

Age	Site index			
	80	90	100	110
A. As obtained from Table 45 of Bulletin 50				
30	3,250	3,850	4,550	5,300
35	3,850	4,600	5,400	6,200
40	4,400	5,200	6,100	7,050
45	4,800	5,700	6,700	7,800
50	5,200	6,150	7,200	8,400
55	5,500	6,450	7,600	8,850
60	5,700	6,700	7,950	9,250
65	5,900	6,950	8,200	9,500
70	6,050	7,100	8,400	9,750
B. As obtained by the statistical method				
30	3,170	3,635	4,190	4,550
35	3,630	4,100	4,670	5,040
40	3,840	4,320	4,900	5,280
45	3,980	4,470	5,060	5,440
50	4,070	4,576	5,177	5,570
55	4,170	4,690	5,300	5,700
60	4,260	4,790	5,410	5,820
65	4,350	4,880	5,520	5,930
70	4,420	4,970	5,610	6,040

TABLE 4

COMPARISON OF VOLUMES IN TERMS OF BOARD FEET (INTERNATIONAL ¼ INCH RULE) PER ACRE 7 INCHES AND UP

A. As derived from Table 53 of Bulletin 50 converted to the ¼ inch rule from the ⅛ inch rule

Age	Site index			
	80	90	100	110
30	11,312	15,385	19,910	24,888
35	15,837	20,815	26,245	32,580
40	19,910	25,792	32,128	38,915
45	23,530	30,318	37,105	44,798
50	26,697	33,937	41,178	49,323
55	29,412	36,652	44,975	53,395
60	31,222	38,915	47,513	57,015
65	33,033	40,725	49,775	59,730
70	34,390	42,535	51,585	61,540
B. As obtained by the anamorphic curve method				
30	13,200	16,600	19,300	22,000
35	16,000	20,400	24,000	26,600
40	18,000	23,200	26,800	29,600
45	19,400	24,800	28,800	31,700
50	20,400	26,000	30,000	32,200
55	21,200	27,000	31,200	34,700
60	21,700	27,900	32,300	35,800
65	22,200	28,700	33,200	36,900
70	22,600	29,300	34,200	37,900

comparable results can be secured by the former method in much less time than that consumed by the statistical method.

Examination of the data presented in Tables 2 and 3 raises the question as to whether the values in Bulletin 50 are correct. For sometime there has been a feeling that these values, especially the yield values, were incorrect. To investigate further the apparent discrepancies in yield values, the yield in board feet (International ¼-inch rule) was computed using the anamorphic curve method. The values obtained and a comparison with those derived from Bulletin 50 are shown in Table 4 after converting the latter values to terms of the ¼-inch rule. This table as well as Table 3 speak for themselves.

Comparison of the values in Tables 3 and 4 make it appear that the yield values in Bulletin 50 are overly optimistic and therefore in error.

Conclusion

This study, having the twofold purpose of comparing two methods of constructing yield tables and of checking the values obtained with those of Miscellaneous Bulletin 50 of the United States Department of Agriculture, is based on 240 one-acre plots of loblolly pine. The following conclusions are reached:

1. The results obtained by the statistical method and the anamorphic curve method compare favorably as shown in Table 1.
2. The statistical method is much more cumbersome than the anamorphic curve method, a factor which is a great disadvantage in view of the fact that the results attained are essentially the same by either method.
3. The yields, cubic feet and board feet, appearing in Bulletin 50 are greatly in excess of those found by either of the methods used and are therefore believed to be incorrect.

COMMENTS

By Francis X. Schumacher
Duke School of Forestry

CHAPMAN and Sylvester report that the yield table figures of U. S. Department of Agriculture Miscellaneous Publication No. 50 bear no resemblance to the yields in cubic feet and board feet obtained from 240 sample plots, collected by the Yale School of Forestry, in even-aged, old-field stands of loblolly pine in La Salle Parish, Louisiana, and Ashley County, Arkansas. Sylvester provides tables based upon these data and Chapman states that at 70 years the previously published tables overrun the new ones in cubic feet by 37 and 61 per cent for the 80 and 110 ft. site indices respectively; the corresponding overrun for the yields by the International ¼ inch rule is 52 and 62 per cent.

Chapman then suggests—

". . . it would seem that these yield tables for southern pine in Miscellaneous Publication No. 50 should be promptly revised, by proper statistical methods, and in the meantime withdrawn from circulation, especially as the accompanying yield tables for longleaf and shortleaf pine show similar tendencies."

Perhaps it is merely incidental, but Sylvester reports that the study is based upon loblolly pine! There is no vestige of "accompanying yield tables for longleaf and shortleaf pine."

The collectors of the data basic to the yield tables of Miscellaneous Publication No. 50 seemingly considered normal stocking to be heavier than one is led to believe the collectors of the 240 Chapman-Sylvester plots did, at least in the higher ages. But this is not a sufficient reason to withdraw the earlier tables; for a collector's criterion for acceptance or rejection of sample plot material for normal

yield table purposes is a very subjective one. Significant differences among the collections of different men are the rule rather than the exception.

Chapman does not help the reader in the least to judge the probable reasons for the discrepancies cited. Are they due to different conceptions of normality on the part of the collectors? Were the same volume tables used? Were the same proportions of the trees tallied as of the dominant class? Are there differences in the method of determining height of average dominant tree? Are there differences in definition of plot age?

Unless Chapman identifies the real sources of the differences his criticisms are not very helpful.

Why did not the "ten years of subsequent investigations" include comparison with Forest Service plots in an effort to run down the differences? During most of the last 10 years, the writer was in charge of the Section of Forest Measurements; and he would have welcomed such an investigation. Furthermore, the writer has found the Forest Service extremely helpful in any investigation designed to ferret out the truth, before, during, and since his connection with that bureau.

A case not dissimilar to the present one, is that of the yields of Douglas fir in California, under investigation by the California Agricultural Experiment Station, in 1927-29, as against those of Washington and Oregon, carried out by the Forest Service. The differences were at first disconcerting, but after further study they were reconciled to the writer's complete satisfaction through the splendid cooperation of the Pacific Northwest Forest Experiment Station in opening its records to his examination.[1] The outcome of this investigation—superimposed on that of Douglas fir yields in California—was a better understanding of Douglas fir behavior. Without the added investigation, the differences encountered would not only have remained unexplained; but might have led to serious misunderstanding between workers in the two agencies.

Chapman states that Sylvester's part is the comparison of two methods of constructing yield tables, namely, (a) the anamorphic graphic method, presumably that of Bruce[2] and Reineke,[3] and (b) the method used by Osborne and Schumacher[4] on red gum, which he dubs the statistical method. In which respects the second method is more statistical, or less graphical, than the first, is not clear to one who had previously used both.

The real difference between these two methods may be summarized in a sentence: In the anamorphic method the tables are based upon the assumption that the yield curve of any site index bears a constant ratio to that of any other site index; whereas the second provides a test of this assumption and a correction to the tables if it is not justified. It is important to note that the data themselves contain the information as to the validity of the assumption. Obviously, however, such information may be extracted only upon the expenditure of time and care; obviously also, it may be learned *after* the test has been made that the assumption is not invalid.

Sylvester writes—

"The anamorphic curve method is preferred over the statistical method because comparable results can be secured by the former method in much less time than

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[1]Schumacher, F. X. Yield, stand and volume tables for Douglas fir in California. Univ. Calif. Agric. Exp. Sta. Bul. 491. 1930.

[2]Bruce, D. A method of preparing timber-yield tables. Jour. Agr. Research 32: 543-557. 1926.

[3]Reineke, L. H. A modification of Bruce's method of preparing timber-yield tables. Jour. Agr. Research 35: 843-856. 1927.

[4]Osborne, J. G., and F. X. Schumacher. The construction of normal-yield and stand tables for even-aged timber stands. Jour. Agr. Research 51: 547-564. 1935.

that consumed by the statistical method."

Perfectly true *if* the assumption of constant ratio is justified. As stated above, however, this cannot be known unless tested.

Now the ratio of yields of one site to another is constant if the coefficient of variation of yield—i. e., the ratio of standard deviation of yield to average yield of the same age class—is independent of age. According to Sylvester, however—

"With the data used, the curves of standard deviation and coefficient of variation did not seem to have a definite trend."

Such a statement is absurd! For if the standard deviation shows no definite trend, its average value must be taken as constant, and the ratio of a constant standard deviation to an *increasing* average yield (Tables 1, 3, 4) can only result in a *decreasing* coefficient of variation. In the face of increasing yields, therefore, either the standard deviation or the coefficient of variation must be a function of age. Both of them cannot be independent of age.

The complexities of gathering yield table data, of constructing the tables, and of using them unambiguously, are manifold. Foresters, nevertheless, are required to predict timber growth. It is therefore to be deplored that Chapman and Sylvester, with the backing of 240 sample plots, do not offer either a helping hand to the direct solution of these difficult problems or constructive criticism of the work of others who have been engaged on them.

ACQUISITION by state and federal governments of approximately 148,000,000 acres of forest lands now in private ownership is proposed in the annual report of the National Forest Reservation Commission, transmitted to Congress by its president, Secretary of War Woodring. Studies show that about 48,000,000 acres should be purchased and administered by the states and 100,000,000 acres of forest lands acquired by the federal government, the report says. Including expenses incident to acquisition, the Commission estimates the federal share of the program on the basis of current values would be approximately $700,000,000. Of the 100,000,000 acres recommended for purchase by the federal government, the Commission reports that 29,003,000 acres are within the boundaries of established National Forests under administration of the U. S. Forest Service and 9,800,000 acres are within the boundaries of designated National Forest purchase units.

Investigations by the Forest Service and other agencies indicate that almost one-third of the total land area of the 48 states, or 615,000,000 acres, will yield the highest or most permanent social and economic services through the agencies of forests. For most of such land, the Commission foresees no economic use or service equal to that of forest production.

COMMUNITY FORESTRY: A NEGLECTED PHASE OF THE AMERICAN FORESTRY PROGRAM

By NELSON C. BROWN
New York State College of Forestry

In Europe community forests are a *fait accompli*. In the United States little progress has been made in the development of such forests. Last summer Prof. Nelson C. Brown had an opportunity to study community forests in Europe. He is now engaged by the Forest Service to explore the possibilities of community forests in the United States. The extent to which European communities have undertaken the development of community forests and their financial and recreational possibilities will be of especial interest to American foresters.

TO chronicle the events that have led to the achievement of the system of community forests[1] in Europe would make an interesting story to all interested in American forest conservation. It would furnish a pattern that might well be followed in the United States. We have developed a magnificent system of national forests and parks, and our program of state forests and parks is well organized on the pathway of progress.

But we have accomplished relatively little in the field of town and community forests. True, in some New England states, and under helpful initiative and guidance in other states, some forward progress may be noted. Wisconsin has made a promising beginning in county forests. Some abandoned farms have been purchased for community forests at a cost of from $5 to $10 or less per acre. There are reported to be more than 1,000 community forests in 27 states, the largest numbers being in New York, California, Massachusetts, New Hampshire, Michigan, Vermont, and North Carolina. Altogether, however, their possibilities and potentialities have been scarcely touched. We need a better balance of publicly-owned forests and those owned by communities should be greatly increased.

While the history and development of these forests abroad are different from those which may be established here, the basic principles underlying the ownership, operation and objectives of this type of forest administration are directly applicable here.

In Switzerland 66 per cent, and in Bulgaria more than one-half of the total forest area is owned by communities, principally little villages, towns and cities in the forested districts. In both Germany and in France, 20 per cent of all the forested area is in this type of ownership. Most of the Black Forest is owned by the villages and cities within its confines. About 48 per cent of the forest area of the State of Baden is similarly owned. In the State of Hesse, there are 2,000 separate communities, 1,300 of which own and operate their own forests.

The famous Sihlwald, near Zurich, Switzerland, and the forests of Baden-Baden, Heidelberg, and the great city park of Berlin, known as the Grunewald, are well-known examples of the profitable operation of community forests for financial revenue, outdoor recreation, employment, and aesthetic values. We have drawn a sharp distinction between forest and park management and administration in this country. There is the same love of

[1]Community forests are also known as municipal, city and town forests, town woods, village and communal forests. They may be operated for schools, educational and charitable institutions, or for other group enterprises.

nature, respect for the scenic and beautiful, and regard for the preservation and non-commercialization of the many beauty spots and scenic treasures in Europe as in the United States. Many in this country would seriously deplore the very thought of combining exploitation with recreation, beauty and the things we hold dear on the same general areas. And no one would ever think of cutting trees in the many beautiful city parks found throughout the nation. But there are many areas immediately surrounding many of our smaller communities that would make admirable locations for this combined forest-park idea. Baden-Baden, a city of 30,000 people, has an annual visitation of 90,000 people who come for the curative properties of the waters, scenic beauties, and recreational pleasures of that delightful Black Forest center. And yet it is one of the most profitable and most beautifully managed forests to be seen anywhere in Europe. The net profit in 1937 was about $125,000 from 13,500 acres. Moreover, there is no outcry of exploitation, commercialization, or feeling that any of the recreational and aesthetic values are being jeojardized or endangered.

The current era in the progress of American forestry may be envisioned in retrospect as one of great expansion of publicly-owned forests and parks. The demands for recreational outlets are being properly considered, and future generations will bless us for the advance of forest and park expansion which has signalized recent years. Wilderness areas are receiving attention, and very properly should. Because of our excellent system of highways and inexpensive automobile transportation, over 30 million people are enjoying the National Forests and many more millions the National and State Parks. But close at home, we need greater outlets for winter and water sports, golf, fishing, and all the things that go with outdoor recreation.

This is all very well and proper, and people are willing to pay the price. But municipal expenses are mounting. Taxes are becoming increasingly burdensome. What would our citizens think of shrinking instead of expanding tax bills that must be met from the bank account of each family every year? Many European forests yield sufficient revenues to pay a good part—in some cases all—of the annual budget for municipal expenses. We pride ourselves on being a practical people. Possibly we are too commercial. But haven't we overlooked a "good bet" in the development of American forestry? Have we neglected a phase of the subject that may pay the largest dividends per acre or per capita or per family in pleasure and profit?

The development of community forestry in Europe represents a long process of planning and accomplishment dating back to feudal times. But Rome was not built in a day. It is not too early to focus our attention on an important and most promising, and perhaps neglected, phase of planning for future development.

Civic pride is a powerful factor in Europe. It is very pronounced and firmly entrenched in many sections of the United States. It is the bulwark of strong public opinion that enabled many communities in Europe to formulate and maintain these forests. Each citizen is a stockholder in them and they are close at hand. He has personal pride and pleasure in the forest maintained for his financial profit and for the enjoyment of himself and his family. Many organizations in the United States are seeking outlets for their civic pride in making their communities happier, richer and more worthwhile, both for the present and the future. Luncheon clubs, chambers of commerce, county agents, American Legion posts, women's clubs, garden clubs, Izaak Walton League chapters, Boy Scouts and many other groups could well further this movement

Objectives

Multiple and coordinated utilization of all the values and resources available in these woods for the benefit of the citizens —this seems to be the central theme or objective in the management of these areas in Germany. The direct implications, therefore, are the maximum financial revenues consistent with the highest spiritual and greatest mental and bodily values that may accrue. This is the very essence of the spirit and goal of forestry. Thus aesthetic, silvicultural, commercial and spiritual considerations are involved—and each given its proper place in the plan of operations. There is a proper balance between the economic and recreational aspects. The local forester in Germany, directed from the Forstamt (district headquarters) handles all of the activities of timber cutting, silviculture, game management, sale of pasture, gravel or other minor products, fire and pest prevention, recreation—and effectively. He is generally skilled and experienced in all these activities. In Baden-Baden, in addition to the Chief Forester, (Oberforstrat) Rothmann, who has efficiently handled this forest for 28 years, there are 12 foresters or rangers, 100 wood cutters, 60 workers on roads and improvements and about 100 temporary employees. This means a permanent employee for each 72 acres.

Advantages of Community Forests

The advantages of community forests may be summarized as follows:

1. Definite and assured financial returns from forest management operations. Community forests in Europe have proven to be very profitable. This may be the most important single objective. In many parts of Europe, the citizenry is relieved of partial or in many cases the entire burden of taxation for municipal operation and maintenance. With the rising tide of municipal taxes, this program may be well considered, particularly by the smaller villages and communities located in forested districts and where the most profitable utilization may be enjoyed. As a source of future timber crops of high value, close to markets, they enjoy great possibilities.

2. Recreational opportunities may be greatly expanded and their values may be preserved at little, if any, cost to the people of these communities. We need better and more recreational facilities close to home for low-income family groups. The time element in travelling to recreational areas is important because these groups may have no extended vacation periods and Sundays, holidays, and late afternoons may be the only opportunities for outdoor relaxation. The automobile with its low-cost transportation and attractive highways is carrying our people great distances for their recreational outlets. But this means considerable time and expense to enjoy these facilities. We need more winter and water sports and recreational facilities near living centers. The importance given to skiing, tobogganing, snowshoeing and other winter sports in the North and the Northeast has been amazing in recent years. Not only swimming and boating but golf and archery, as well as hunting and fishing, are facilities that should be encouraged and developed. Forest operations and park objectives are successfully maintained and achieved in Europe on the same general areas. Forests are profitable, parks are expensive. The two are happily combined with no prejudice or interference with the development of each objective.

3. Aesthetic features are not destroyed or endangered. Trees along trails, highways and in glens and about lakes are maintained in their native and wilderness condition. Those who love the forest for its beauty and its sentimental and perhaps scientific features do not have their sensibilities shocked as one might reason-

ably expect. There is not the sharp delineation of viewpoint between park and forest objectives in Europe. We should look to the forest for aesthetic, as well as recreational and commercial values.

4. Definite and assured fuelwood supply for the citizenry. While this may be important in some restricted rural sections of this country, this is exceedingly important in many European villages, particularly in southern Germany, eastern France and Switzerland where other forms of fuel are not closely available and, therefore, exceedingly expensive. Wood fuel will always be an important product in many forested sections of this country and if unemployment continues, the provision of adequate fuel supplies for warmth and cooking for the poorer classes at little or no cost may be an important feature. Thus our poorer classes may be assured an abundant and low-cost fuel supply.

5. These forests may provide steady employment for large numbers of men and be available as "work reservoirs" during economic depressions. In Europe, the principal occupational effort is in cutting, thinning, logging and transporting wood products. Large numbers are also employed in tree planting, road construction, improvements and repairs, fire protection and many other features of woods work. The ratio of permanent employees is generally one man for each 50 to 100 acres and in highly developed areas 24 to 30 acres. Special projects may require large numbers of the unemployed for temporary periods. Technological unemployment may continue to be a current problem in this country. If so, provision must be made for the employment of large numbers of people. As the Civilian Conservation Corps program resulted in greatly stimulating and expanding our system of state parks and forests, so it may provide for development of work on municipal forests as it has on other forms of public properties. If the unemployment problem continues, community forests may offer very definite outlets for profitably employing large numbers of idle men. Through steady employment comes greater stabilization of community life in contrast to the transitory nature of many of our forest communities in the past.

6. The city may control the real estate policies and extensions of residential districts. Modern trends are definitely toward better city planning. These objectives can be adequately served. Many of our communities are "a hodge-podge of growing up like Topsy." The acquisition of nearby areas at relatively low costs may assist local planning commissions to provide a permanent real estate policy which means more stable, better-appearing and more attractive communities. Village-owned forests may lie on the outskirts and environs of communities and nearly every family owning an automobile, has the tendency to "spread out" in planning the location of a new home.

7. They may be purchased or organized at relatively low capital expenditures. The investment position may be most favorable. Advantage should be taken of tax reverted or idle or abandoned farm land and unproductive or unsightly, eroding areas wherever available. With the depressed condition of agriculture and the trends from rural to city living, advantage should be taken of any opportunities for acquisition of these lands.

8. The state forester in each state can provide leadership, direction and stimulation in the organization and management of these municipal properties. Fortunately the management of many of our city park systems and state forests is not jeopardized by political interference. The state forester could give direction, cohesion and stability in the formulation and evolution of plans for municipal forests. In some states as in Massachusetts, forestry associations may be of great assistance in lending support in public education and

in stimulating activity on the part of local leaders. The advantages of direction through central leadership in the state forestry office may be the determining factor in the success of a program of community forests in any state.

9. They may serve as combined demonstration forests and parks to the people who own them. Citizens of European communities are tremendously proud of their local forests. They are efficiently managed. And the people enjoy great educational advantages, particularly the various youth movements who may use these forests as laboratories for observation or for camping or picnicking and the study of wildlife, insects, botany and other aspects of forest life. Thus the citizenry may obtain splendid educational advantage from demonstrating the benefits of forestry and conservation to both young and old.

10. An adequate, pure and assured flow of water for drinking purposes, as well as for irrigation or other storage purposes, may be the most important single objective in some communities. Already many areas have been acquired and planted for this single purpose.

11. Continuity of plan and purpose are assured. Individuals cannot wait until timber crops mature, but counties, villages and cities can do so because of their permanence.

12. These areas also may be used for growing trees to be used in street and park planting, for growing Christmas trees as well as partially for pasture, as a source of gravel or other by-products, or the gathering of nuts, berries and mushrooms, which in several European forests are of considerable importance. Communities may take advantage of free or low-cost trees for planting supplied by state nurseries. The revenues from fishing and hunting privileges are important sources of income in nearly all German and Swiss forests. The very essence of sustained-yield management and multiple purpose forestry are served by them.

Favorable Conditions

Conditions under which municipal forests may be initiated and managed may be summarized as follows:

1. Where cheap land, either forested at present or capable of yielding a satisfactory growth, may be acquired. Tax-reverted lands, idle and abandoned farms, eroding hillsides, and unproductive or waste land are suggested important possibilities.

2. Large areas owned by small communities. The most successful examples of community forests in Europe are those small villages which own relatively large areas of timberland in their vicinities. Here, the per capita yield from the sale of forest products or the profit per family may be greatest and, therefore, the relief from tax burdens may be most favorable.

3. Locations near or adjacent to favorable markets. Profitable utilization and successful marketing are the keynote of commercial success in the operation of these forests in Germany, Switzerland, and France. Thus, there is stabilization of employment and community living. In most of these communities, local industries consume the larger portion, if not all, of the timber products from the forest.

4. Locations in natural forest regions. Nearly every community in Germany, France, Switzerland, Austria, Czechoslovakia, especially in the forested districts, own their own forests. This is notably true in the Vosges of eastern France, the Black Forest, Odenwald, Boehmerwald, and throughout the States of Baden, Wurtemberg, Bavaria, and Saxony. But even in the Middle West groves of natural or planted woods are needed for the many benefits that may accrue from them.

5. Combined state and local supervision. In Germany, expenses of operation are minimized by state supervision. If

the areas are not sufficiently large, the state foresters could lend direction, assistance, and the benefit of technical guidance until the local administration can be sufficiently developed and purchased areas sufficiently expanded to justify local forestry administration.

6. Sequence of developments. The park idea may be the most forceful and popular motive behind the initial stages of the project. People readily understand parks and their objectives but the idea of a working and profitable forest, at least, in its initial stages (when financial income may be impossible) has not yet sufficiently penetrated the conscience of the average citizen. Valuable mature timber may not be acquired at first, because of the expense involved. Many may be started as reforestation projects, perhaps for watershed or erosion protection or to improve the condition or appearance of waste or idle land. A recreational development may appeal best, at first. When the growing plantation or natural timber reaches commercial sizes, financial revenues will come. Thus there will be a gradual emergence of the "forest for profit" idea—a combination of forest and park. But no restrictions should be made to prevent future cutting and marketing of the standing timber.

Community Forest Possibilities in the United States

Among a number of impressions gathered on a recent study of community forests in Europe, the following observations may be of interest as throwing additional light upon the possibility of introducing this subject in the United States:

In Europe community forests are the outgrowth of the ancient "village common" idea—that is, common ground used for pasture and fuel for warmth and cooking before coal was discovered and used. These original objectives have almost disappeared in some parts of Europe. Now they are principally operated for:

1. Profit and
2. Recreation

with preponderant emphasis on financial revenues. The old feudal right of peasants to gather free fagots and other forms of fuel wood still exists in many sections.

1. Community forests may be acquired by: A. Purchase; B. By gift as a memorial to some outstanding citizen, to honor war veterans or an historical event. They may be denoted by some public-spirited citizen interested in the improvement of the appearance and the possibilities of profit from the operation of areas on the hillsides adjacent to these communities; C. Bequest in wills of lands or funds to be made available for these purposes; D. Transferring community-owned farms, watersheds, reservoirs, or tax reverted lands into this type of forest operation.

2. Profitable utilization through successful marketing of the wood product is the keynote of financial success. In Europe it has been demonstrated that local outlets present the most profitable form of utilization. Frequently small saw mills or other industries are established to utilize the flow of logs from these forests. Sometimes these industries are supplied with sawlogs from a combination of community, private and state forests. Occasionally, a local business, such as furniture, woodenware, shoe last, novelties etc., may be developed or expanded as an outlet for the principal products. Farm timbers, posts, poles, bridge planks and stringers, hayracks or other specialized forms may yield attractive revenues whereas the conversion of sawlogs into the usual forms of lumber may not prove to be so profitable because of competition from outside sources. Frequently the forester's experience in utilization problems is the deciding factor in the profitability of the operation. Utilization phases usually command about 80 to 90 per cent

of the time of all the permanent workers in the forests.

3. A small initial investment has often resulted ultimately in large annual revenues. From a few typical community forests visited in 1937, the net income per capita ranged from $2.20 to $11.57. The income per family varied generally from $11 to more than $60 per annum which is more than sufficient to pay the average family tax bill. Expressed in revenue or net income per acre, this varies from about $3.50 up to $15.50 per acre and in unusual cases still higher. A little village (of 535 souls) in Bavaria which owns 413 acres of dark, rich, lush spruce forest so typical of that region produces an annual cut equivalent to 424,000 board feet. This yields a net annual profit of $6,800 which is a net income per capita of $12.71, an income per family of $63.55 and a net income per acre of $16.46. This forest employs six men permanently and the acreage per employee is 69. The famous Grunewald forest, which is regarded as a great city park in Berlin and contains about 10,000 acres, yields a gross income of from $260,000 to $340,000 and an annual average profit of $152,000. This forest happily combines large financial profits with a great recreational park daily visited by as many as 100,000 people. A little village of 139 people in southern Germany owns a small forest of 63 acres of Norway spruce. The net annual profit from wood products and hunting licenses is $1,608, which is an income per capita of $11.60, an income of $57.43 per family, or an income per acre of $25.54. The people of this little village also own, personally, 327 acres from which an annual profit of $8,040 is received. The income per family from the personal and community forests, therefore, is more than $366 per family per year. There are 10 employees on the village forest so that the average acreage per employee is only six, which is the lowest known in Europe.

There are many examples indicating the remarkable profitability of these community forests. Sometimes these forests are operated exclusively to maintain hospitals or homes for orphans, the aged or the poor. In some cases, the annual growth of timber is not actually cut, but saved up periodically. For example, in one village a seven years' accumulation of growth resulted in sufficient net revenues to pay for a new $40,000 reservoir pipe line and a new $6,400 kindergarten school.

4. In Europe, the area of community forests varies from as small as 63 acres up to more than 62,500 acres as in the case of Berlin which is the largest single owner of municipal forest in the world. In a typical ranger district among rural communities in Bavaria, the average size of 41 community forests was 188 acres. They generally vary from about 100 acres to 1,000 acres. As indicated elsewhere, the ideal forests are those of the small villages which own relatively large areas of timber land. Thus, the net income per citizen or per family may be unusually high under these conditions, particularly if the income per acre is favorable.

5. In these days of forward looking plans and with the vast array of state, county and local planning boards, the formulation of community forests may have an important bearing upon the trends in real estate, traffic, housing and commercial expansion. Community forests fit in admirably with city planning.

6. In France and Germany and other European countries, forest operations on several types of ownership are supervised from a single headquarters. With the expansion of our state forestry organizations into districts, it may be possible to assist and advise in the formulation and operation of many community forests. They should "head up" under the state forester. For example, in one district forest headquarters in Germany known as a Forstamt, supervision is exercised over

three types of ownership consisting of community, state and private forests. There are about 21,000 acres of forest land in the entire district of which 7,713 are community, 4,915 state and 8,338 private forests.

7. Community forests reflect the system, orderliness and efficiency as well as the civic-mindedness and pride which generally characterize the German people. They regard them as a part of their personal property and heritage. These forests pay as they grow—and accumulate value like money at interest in a savings bank. These local, "home-town" forests will awaken a keener appreciation and deeper understanding of the meaning of forestry to our peaple.

Plywood Utilization

THE production of plywood in Canada and the United States has been practically doubled during the past five years as a result of improvements in wood glues and the consequent extension of the uses of plywood. By using water-resistant bond, plywood may be used for the construction of walls, houses, railway freight cars, concrete forms or any purpose necessitating exposure to atmospheric conditions. To obtain the thin strips of wood or plies, a log is stripped of its bark and soaked and steamed until it is softened. It is then put into a machine like a turning lathe and set revolving against a long knife.

While science is overcoming many of the difficulties experienced in the use of plywoods in construction and other trades, plywood is by no means a product of our modern age. Centuries ago, in fact, 1,400 years before the Christian era, thin sheets of wood were used for decoration, but how these veneers were held together remains a mystery. Modern plywood is made by glueing together thin sheets or plies of wood with the grain of alternate plies at right angle. Wood assembled in this manner is of nearly equal strength parallel to and across the grain of the outer plies. This equalization of strength permits the use of plywood for boxes and crates in place of the heavier strips of sawn wood, resulting in reduction of weight and a saving of transportation costs.

SPREAD OF BLISTER RUST TO SUGAR PINE IN OREGON AND CALIFORNIA

By J. L. MIELKE[1]

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White pine blister rust was unknown on sugar pine within its natural range until 1936, when the fungus was found on this tree species at several places in Oregon and at two places a few miles across the line in California. 1936 was also the first year that the rust was found on ribes in California. During 1937, a rather wide spread of the rust to ribes occurred in the state, extending southwards for about 125 miles both in the coastal mountains and in the Sierra Nevada. The writer discusses the present known distribution of blister rust in the two states together with its behavior on sugar pine, which, according to all evidence to date, is a highly susceptible species.

WHITE pine blister rust (*Cronartium ribicola* Fisch.) was evidently introduced into western North America directly from Europe in 1910, at Vancouver, B. C., where it was found for the first time in the West in the fall of 1921 (2). From the beginning it was recognized as a potential menace to the highly valuable and extensive stands of western white pine (*Pinus monticola* Doug.) to the eastward and of sugar pine (*P. lambertiana* Doug.) to the southward (16). Results of studies conducted in 1922 and 1923 (14) indicated what has since been found to be true: that spread of the rust would probably take place more slowly southward into the sugar pine region in Oregon and California than eastward into the western white pine forests of Idaho. By the end of 1935 the rust was common on *Pinus monticola*, in western Washington and northwestern Oregon. By that time also it was quite generally distributed on this species in the Inland Empire (northeastern Washington, northern Idaho, and northwestern Montana), having become established there at least as early as 1923 (15, 19).

Invasion of the Rust Into the Sugar Pine Region

The range of *Pinus lambertiana* is centered in California and thence extends southward for a short distance into Lower California and northward into Oregon, with scattered small patches of the species occurring as far north in the Cascade Mountains as the vicinity of Mt. Jefferson.

Blister rust was not known on native sugar pine until April, 1936. At that time it was discovered in two places in Oregon—near Iron Mountain in Coos County and southeast of Mt. Jefferson along the lower Metolius River in Jefferson County (1). About two months later the first case of this fungus to be reported for California was found on *Pinus lambertiana* near Monumental in Del Norte County (20), and in the fall of the same year a second area of sugar pine infection was located in the state—along the East Fork of Indian Creek. Information to date indicates that the rust probably had its inception on this host in California in 1930.

The present known distribution of blister rust in the sugar pine region of Oregon and California is shown in Figure 1. All discoveries on *Pinus lambertiana* in the two states to date were made in 1936, and this is the only white pine host on which the rust has yet been found in California. Rather extensive spread of

[1]The writer is indebted to W. W. Wagener and J. L. Bedwell, Division of Forest Pathology, and to W. V. Benedict and T. H. Harris, Division of Plant Disease Control, Bureau of Entomology and Plant Quarantine, for making available to him some of the data on which this article is based.

the fungus to ribes[2] occurred during 1937, however, both in southern Oregon and northern California, particularly in the latter state. Within the area (Fig. 1) bounded by a broken line, ribes infection was more or less general and over a portion of it in the Klamath River region in California and adjacent Oregon, about one ribes bush out of every hundred on an average was infected. The presence of the rust in California evidently resulted from long-distance spread of wind-borne aeciospores from infected pines situated somewhere to the north.

Susceptibility of Sugar Pine

It has been known for 50 years that the rust can attack *Pinus lambertiana* (17 p. 11). More recent observations in Europe (18) and tests in British Columbia (11) indicated that it is highly susceptible, even more so than *P. monticola.* Since these observations and tests were made outside the natural range of the species where its reaction to the rust may not be typical, the results may possibly be questioned. The experiences (in 1936 and 1937), with naturally infected sugar pine within its natural range, however, substantiate the previous reports.

The discussion that follows is confined mainly to the Panther Mountain locality because the rust has been established there for a longer time than at any of the other newly discovered points of infection (Table 1). Infected pines were found on the summit of the mountain and extending downwards therefrom for about a mile on both the east and west sides. Most of the rust, however, was concentrated on about 30 acres on the east slope just below the summit, and it is there that the initial infection occurred. This central area is steep, rocky, mainly covered with brush, fully exposed to the morning sun, and shows every evidence of being an unusually dry site for one situated only 10 miles from the coast and in a region that is generally quite moist. The sugar pines, most of which were of sapling or pole size, were scattered through the brush and in association with a few Douglas firs (*Pseudotsuga taxifolia* [Lamb.] Brit.).

Ribes cruentum Greene apparently was responsible for the establishment of the rust. The species was found only near the summit of the mountain where it is limited in its distribution to a few acres over which the bushes occur rather abundantly. Most of them are on the 30-acre area in the vicinity of the place where the initial pine infection occurred. On that tract it was the only ribes seen with the exception of two bushes of *R. glutinosum* Benth. on which no rust was found. The latter species, however, is somewhat more common farther down the mountain on both the east and west slopes, along with a few small *R. bracteosum* Doug. Some bushes of each species were found to be lightly infected but evidently neither of these Ribes has been important in the development of the rust within this general area.

Although the rust had been present at Panther Mountain only about 11 years, pines up to approximately 35 feet in height were already dead, others were dying, and others somewhat larger were

Table 1

Blister rust on sugar pine in Oregon and California

State	County	Place	Probable year of origin
Oregon	Coos	Iron Mountain	1929
	Jefferson	Metolius River	1932
	Curry	Panther Mountain	1926
		Windy Valley	1927
		Lost Valley	1929
	Lane	Sharps Creek	1932
California	Del Norte	Monumental	1931
	Siskiyou	East Fork Indian Creek	1930

[2]The common noun "ribes," as well as the genus name Ribes, is used in this paper to include both currants and gooseberries.

so badly diseased that their death was predicted within a few years. Practically every twig and branch on most of these trees bore one or more cankers. On some of the larger trees growing in the open and with long branches, dense foliage and almost full length crowns, infections were so numerous that they totaled several thousands per tree. In general, the cankers were almost as abundant in the upper as in the lower parts of the crowns. Figure 2 shows blister rust in the top portion of a 35-foot sugar pine.

The destruction of the pines by the rust at Panther Mountain has taken place at an extraordinarily rapid rate, particularly in the smaller size classes. Of 112 pines examined, comprising almost all on the 30-acre area, the diameter group 3 inches to 12 inches d.b.h. contained 72 individuals of which 16 were dead and the remainder or 56 dying. Of the trees from 12 inches to 30 inches d.b.h. all were infected, many of them severely. Pines less than 3 inches in diameter were scarce and practically all dead. This rate of damage is perhaps greater than has occurred under similar conditions anywhere else within the range of the disease on any

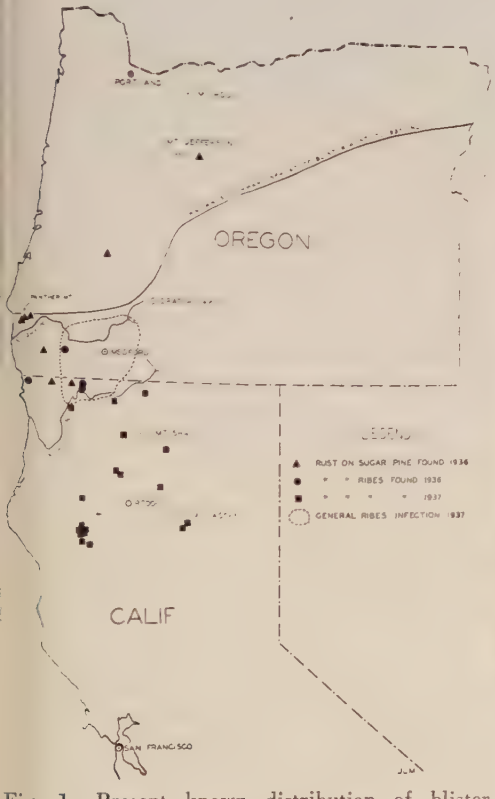

Fig. 1.—Present known distribution of blister rust in the sugar pine region in Oregon and California.

(Photograph by W. W. Wagener)

Fig. 2.—Blister rust cankers in the top portion of a 35-foot sugar pine (*Pinus lambertiana*), which is dying as a result of the numerous twig and branch infections. The older cankers appear as roughened and dark-colored swellings of the bark.

white pine species in either Europe or North America.

The Panther Mountain infection center presented a striking example of the very low resistance of *Pinus lambertiana* to the rust. Though the other infection areas in the sugar pine range were invaded more recently at some of them there was already ample evidence for the assumption that the same picture would repeat itself in time. This was particularly the case in those localities where general conditions were favorable for a rapid increase of the rust, that is, where both pines and ribes were fairly numerous and in close association. Examples of such include the East Fork of Indian Creek in California and Windy Valley in Oregon. On the latter area there were infected pines, ranging upwards to 65 feet in height, which were certain to die within a few years as a result of the numerous twig and branch cankers. At the Indian Creek area the majority of the pines were comparatively much smaller and somewhat less numerous. Only two sporulating cankers were found there in 1936. In 1937, however, many hundreds of young cankers made their appearance, thus indicating again a very rapid rate of intensification of the rust on sugar pine and a high degree of susceptibility of the species.

In the form of attack described previously, which is sometimes termed multiple infection, death results from the individual killing of practically all twigs and branches by innumerable cankers. The fungus thus kills the entire green crown. Although occasionally noted in the highly susceptible *Pinus monticola*, and now observed for the first time in *P. lambertiana*, such an attack apparently has not been reported for the other white pine species known to be susceptible to the rust. Far more commonly, cankers are not merely so abundant on individual trees, and the real cause of the death is the invasion, and consequent girdling, of the bole by the fungus entering from an infected branch.

Development of the Rust on Sugar Pine

Infection of the pines takes place through the needles and enters the bark by way of them. Lachmund (7) found that in *Pinus monticola* the current season's needles are less susceptible to the rust than the older foliage. Studies made to date at the natural infection areas and at test areas elsewhere in the West indicate that this is also true for sugar pine.

In the development of the rust on *Pinus monticola* the greatest number of the young or incipient cankers (orange-colored spots in the bark) usually appear in the second year, pycniospores in the second and third, and aeciospores in the fourth year, respectively, after the year of infection (6). Occasionally, for some cankers or even the majority of them the time required for the first appearance of each of these different stages may be shortened by one year or lengthened by a year or more. To judge from the tabulations of canker development, the rust on *P. lambertiana* follows closely the schedule on *P. monticola*. It was of interest to find that in the majority of cankers on the Panther Mountain area the aecia developed in the third year following that of infection. Local site factors, mainly a mild climate and long growing season, are believed to account for this shortening of the normal period in this case.

The rate of growth of the fungus in the bark of *Pinus monticola* is fairly well known (9). No accurate measurements were obtained on *P. lambertiana*, but it was obvious that growth is somewhat more rapid for the cankers were decidedly larger for their age. In addition to the rapid growth on this species there also occurs a very pronounced swelling of the infected bark.

Pycnia and pycnial scars, closely re

sembling those found on *Pinus monticola*, were very prominent and abundant, in contrast to the scanty pycnial production and relative obscurity of the scars previously reported by the writer (12) for cankers on young sugar pines planted for experimental purposes in British Columbia, far north of their natural range.

Although pycnia had developed in abundance on the diseased bark, aecial production in contrast had not been so prolific at some localities. This was especially the case at Panther Mountain, where the aecia were of normal size but sparse on the cankers regardless of the latter's size or age. The cause of the unusually light aecial sporulation in this instance was not determined nor has a similar sparse production of this spore stage occurred on the many hundreds of infected sugar pines, which were planted by the Division of Forest Pathology on test plots in British Columbia and northern Oregon. In these locations the aecia on *Pinus lambertiana* were numerous and crowded closely together on the cankers, thus resembling aecial production on *P. monticola*.

The life cycle and development of the rust on the two pine species are so similar that it would seem that Lachmund's method (8) for determining the age of blister rust infection on *Pinus monticola* should in general be equally applicable to *P. lambertiana*. It was by this method that the probable year of inception of the rust on sugar pine at the various areas (Table 1) was determined.

Relative Susceptibility of Ribes

During the course of these investigations a number of different species of ribes were found infected by the rust. The relative susceptibility of some of them had already been well established under natural infection conditions within their native habitats in the West, and, therefore, they will not be here considered. The reaction to the rust of three of the species involved—*R. glutinosum*, *R. cruentum*, and *R. nevadense* Kell.—had been determined, however, only by artificial inoculations conducted outside their botanical ranges. Consequently, information on their susceptibility under natural conditions is considered of value.

Spaulding (17) reported that slight infection developed on *R. glutinosum* under greenhouse tests in the East, and observations now made on a substantial basis of this species within its natural habitat confirm these results. From observations of several hundred bushes, *R. cruentum*, on the other hand, was found to be highly susceptible and to produce telia in abundance. This is in accord with out-of-door inoculations on planted bushes of this species near Rhododendron, Oregon, reported by Kimmey (5). *R. cruentum* is a very close relative of *R. roezli* Regel, the most common ribes in the sugar pine region of California—so close in fact that Jepson (4) considers the former only a variety of the latter. The findings in connection with *R. cruentum* are, therefore, considered to support the experimental evidence previously obtained that *R. roezli* is highly susceptible to the rust (13). *R. cruentum* and *R. glutinosum* occur in southwestern Oregon (3) and the coastal region of northern California (4). *R. nevadense* was found infected in several localities in northern California upwards to about 125 miles from any known pine infection, thus indicating the importance of this Ribes in the long-distance spread of the rust as well as substantiating the previous inoculation tests showing a high degree of susceptibility for it. It is a common ribes associate of sugar pine in the Sierra Nevada.

Discussion

Blister rust has now been found over most of the ranges of *Pinus monticola* and *P. lambertiana* in Oregon, having first become established in the northwest

portion of the state whence a more or less steady southward spread has taken place. Its rapid intensification and spread in southwestern Oregon have been retarded because of the scarcity of ribes in association with western white and sugar pines in that region.

In California the rust has been found on sugar pine only in the extreme northwestern part of the state, but spread to ribes has occurred up to distances of about 125 miles south of the Oregon line both in the coastal mountains and the Sierra Nevada. Past history of spread in the eastern and western parts of the United States has amply demonstrated, however, that almost invariably the actual limits of distribution of this fungus have been considerably in advance of its known limits. This was again demonstrated in the present case, for the rust was present on sugar pine in California at least six years before it was discovered. It seems reasonably safe to assume, therefore, that blister rust exists much farther south in the state than is known at present.

Weather conditions determine to a large extent the spread and development of blister rust, and its rapid intensification in the Pacific Northwest may be attributed mainly to the moist climate prevailing there. The influence of the weather on the spread of the fungus in that region has been discussed by Lachmund (10) and Pennington (14). Climatically, the northwestern portion of California is also a very favorable region for development of the rust, for annual precipitation in places there, even as far as 25 miles inland from the coast, exceeds 100 inches. In addition to the heavy precipitation, host associations favor spread. Sugar pine is common and ribes abundant, with at least 12 species represented, practically all of which are known to be susceptible, with some very highly so. Conditions are also favorable for spread of the rust thence to other parts of the state, and such spread may be expected once a greater source of spore material has had an opportunity t develop.

The climate of the main sugar pine be in the Sierra Nevada is drier than that o the Pacific Northwest, and since the ru has been found only on ribes in the fo mer region it still remains to be dete mined how it will develop and grow ther from year to year on both hosts. Howeve other heteroecious rusts, generally simila in nature to blister rust, are indigenous t the Sierra Nevada. Also, sugar pine an its principal ribes associates in thes mountains—*Ribes roezli* and *R. nevadens* —are known to be highly susceptible.

Summary

White pine blister rust was unknown o sugar pine within its natural range unt 1936, when the fungus was discovered o this tree species in both Oregon and Cal fornia. This was also the first year th the rust was found on ribes in Californi where the points of infection on both rib and pines were all located in the extrem northwestern part of the state and with a few miles of the Oregon line. In 193 no new sugar pine infection centers we recorded in either state, but the know limits of distribution on ribes were co siderably increased, with spread to th host extending southwards in Californ upwards to about 125 miles both in t coastal mountains and in the Sier Nevada.

In general, the development of the r on sugar pine was found to be quite si ilar to that recorded for western wh pine.

Observations on sugar pine confirm p vious experimental evidence that the s cies is highly susceptible.

Observations on *Ribes cruentum*, *nevadense*, and *R. glutinosum* confirm results of previous tests that the two f mer species are very high and the la very low in susceptibility.

The rust may be expected to conti its spread into and in California.

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TECHNIQUE FOR EVALUATING THE VIGOR OF PLANTED SLASH AND LONGLEAF PINE SEEDLINGS

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The following paper describes a method of classification for evaluating the vigor of planted seedlings. This method gives a more valid basis for determining the success of planting than do survival percentage records. The author suggests that it might also be used advantageously in making fire damage appraisals, planting surveys, and in other forest work.

DURING the 1934-35, 1935-36, and 1936-37 planting seasons, the Southern Forest Experiment Station planted approximately 750,000 seedlings in experimental tests made on the Palustris Experimental Forest, 18 miles southwest of Alexandria, La., in the Kisatchie National Forest. Included in these tests were a large number of plantings designed to study the factors affecting the early survival of longleaf and slash pine.

When the plantations were examined in the late spring, and again in the fall of the year planted, it was evident that a true picture of the survival of these plantations, and, consequently, their response to experimental treatment, could not be ascertained solely by determining the percentage of living, dead, or missing trees. For example, in some instances the percentage of living trees for two given treatments was essentially the same, but the relative vigor of the two groups of seedlings was very different.

Therefore, a classification method was developed for evaluating vigor of planted seedlings, since in this way would be attained a much more valid basis for determining the success of the planting as well as for predicting the future outcome of the plantation. This method, however, can also be used advantageously for measuring the vigor of trees in making fire damage appraisals, planting surveys, etc.

Method Employed

The classification employed was based wholly on the comparative physical condition and outward appearance of the seedlings, taking into account such factors as size of seedlings, as expressed in total height, base diameter, and needle length; color and abundance of foliage; presence or absence of primary and secondary buds; bark characteristics; extent of injury by disease and insects; and apparent general vitality. The classification was made flexible enough to allow for variation in individual situations and under different conditions; for example, the seedlings of any one class were usually larger on good soil than on poor soil.

The classification used provides for four degrees of vigor, namely:

T_1—very thrifty—seedlings with excellent needle and stem growth (stem diameter only in case of young longleaf) and color and presenting a very vigorous appearance.

T_2—thrifty—seedlings having a good needle growth and color and a vigorous appearance.

G_1—growing—seedlings showing some growth and having a healthy green color.

G_2—growing poorly—seedlings which have not grown, but which are still green.

F_1—failing—seedlings which are losing their vigor and have a yellow cast to the needles; survival considered doubtful.

F_2—almost dead—seedlings which are almost dead and which have decided unhealthy foliage; death practically certain. Only slightly green or not at all.

In addition the symbol *Sp* is used

FIELD EXAMINATION RECORD

Examination by: .....

Test: .....

Species: .....

Tree No.	Plot No. / Row No. / Condition	Vigor	Injury by	Plot No. / Row No. / Condition	Vigor	Injury by	Plot No. / Row No. / Condition	Vigor	Injury by	Plot No. / Row No. / Condition	Vigor	Injury by	Remarks
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
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25													

Symbols:

Condition
L=Living
D=Dead
B=Missing

Vigor
T_1=very thrifty
T_2=thrifty
G_1=growing
G_2=growing poorly
F_1=failing
F_2=almost dead
Sp=sprouting

Injured by
a=ants
e=erosion
f=fungi
d=drought
i=insects (other than ants)
p=poor planting
r=rabbits
s=silting
g=gophers

designate seedlings on which new needle growth has taken place along the stem from adventitious buds, following injury.

A sample of the form used in making seedling examinations for four rows of 25 trees each is presented at the end of this paper.[1] In the first column, the condition of the seedlings, whether living (L), dead (D), or missing (B), is recorded. In the second column is tallied the vigor of the seedlings, following th above classification. The source of i jury resulting in the death or decrease vigor of a seedling is noted in the thir column, the recognized agents of injur being listed at the bottom of the fiel form. In any work of this nature, i which many examiners must be used b cause of the large number of seedling to be examined in a short time, th "personal equation" is likely to be significant source of error that must b neutralized if a fair evaluation of th conditions is to be obtained. Althoug there undoubtedly is some variation vigor valuation between examinatio crews, there is evidence to indicate th this variation is not significant when relatively large number of seedlings examined. For example, when 15 u trained C.C.C. enrollees were used make an examination, surprisingly un form results were obtained by the i dividual men, whose work was checkl and standardized by a technically train forester.

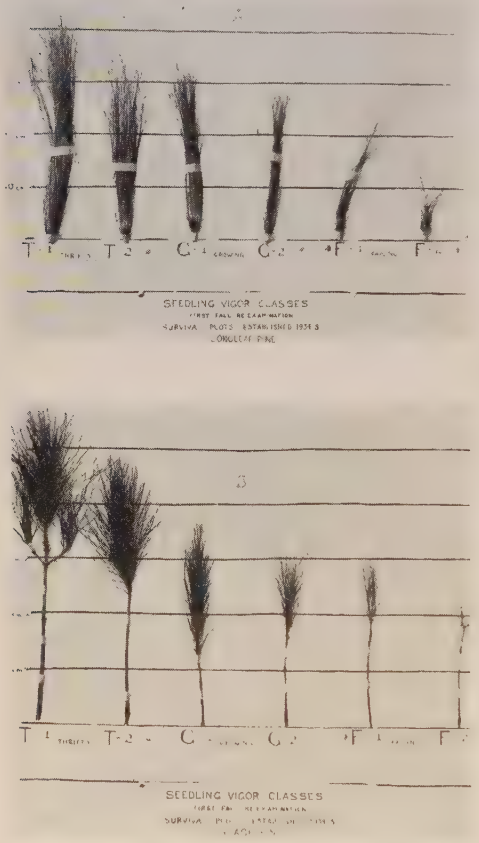

Fig. 1.—Vigor classes of longleaf pine seedlings (A) and slash pine seedlings (B). The horizontal lines are 10 cm. (approximately 4 inches) apart.

The C.C.C. enrollees assigned to th work examined between 1,000 and 1,2 trees each in a 6-hour working day. Th rate of progress can be maintained wit out difficulty if time is not lost in wa ing excessive distances between plan tions or in searching for obscure see lings in dense grass or brush cover.

This vigor classification, which h been successfully used for three seaso is illustrated in Figure 1 for longl pine (a) and slash pine (b).[2] For p poses of illustration, the roots of th seedlings were cut off at the ground l to simulate conditions as encountered the field, where the root system can be seen nor its development be de mined except by excavation.

[1]For additional uses of this form see Wakeley, P. C., and R. A. Chapman. A method studying the factors affecting initial survival in forest plantations. Occasional Paper No. Southern Forest Experiment Station. 19 pp. October 11, 1937.

[2]Similar technique could also be used for other species.

THE DEVELOPMENT OF DECAY IN LIVING TREES INOCULATED WITH *FOMES PINICOLA*

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Seven living forest trees were inoculated with mycelia of *Fomes pinicola* isolated from hosts of various tree species. Ten years after inoculation the trees were felled, cut into sections and the development of decay studied. The fungus was able to cause decay in coniferous and non-coniferous hosts regardless of its source. The maximum decay was in red spruce, where it extended vertically approximately 8 feet.

SPECIFIC knowledge of the development of decay in living forest trees during definite intervals of time is f value to foresters in estimating cull, nd in certain phases of forest manageent. Such information, however, based n exact studies made in American forsts, is almost lacking in forestry literaıre. The data reported in this paper re concerned with the development of ecay caused by *Fomes pinicola* (Sw.). ooke in living trees and, although quite ieager, are considered to be of sufficient alue to warrant making them available other workers. Studies of a similar ature are now being conducted in forest reas of the Adirondacks by the Departent of Forest Botany and Pathology of e New York State College of Forestry.

Procedure

The study was initiated by the junior riter. In the early spring of 1927, *omes pinicola* was isolated from infected ees of the following species growing ıder forest conditions near Cranberry ake, N. Y.: black spruce (*Picea mariıa* (Mill.) B. S. P.); balsam fir (*Abies ılsamea* (L.) Mill.); white pine (*Pinus robus* L.); larch (*Larix laricina* (Du oi) Koch.); large-toothed aspen (*Populs grandidentata* Michx.); white birch *Betula populifolia* Marsh.); and black erry (*Prunus serotina* Ehrh.). The isotes were grown in pure culture upon alt agar. Within the forest 7 healthy ees were chosen for the purpose of inoculation with the mycelia from these cultures. The selected trees were growing along a stream in a stand which was intermediate between the typical Adirondack mixed hardwood type and the softwood type. A tin marker was attached to each tree so that it might be readily found in the future. The seven trees were of the following species: *Populus grandidentata* Michx., *Tsuga canadensis* (L.) Carr., *Picea rubra* (Du Roi) Dietr., *Betula lutea* Michx. f., *Abies balsamea* (L.) Mill., *Pinus strobus* L., and *Fagus grandifolia* Ehrh.

On July 1, 1927, the selected trees were inoculated. Precautions were taken to prevent contamination by other fungi. After sterilizing localized areas of the bark with mercuric chloride, holes were bored in the trunks at breast height with a sterilized seven-eighths-inch bit which extended through the sapwood into the heartwood. Approximately 1 cubic centimeter of agar with the fungus mycelium was introduced into each chamber. The chambers were stoppered with sterilized ash plugs driven into the holes sufficiently to insure the plugs being held in place. In every case a chamber 1½ to 2 inches deep remained behind the plug.

Two holes were made in each of 4 trees so as to permit mycelia from 2 different sources to be introduced into each tree. Following inoculation the trees remained undisturbed for 10 years. On September 18, 1937, they were felled, cut into sections, and studied. The results are tabulated in Table 1.

Results and Conclusions

Although the fungus was alive in 4 of the trees for 10 years, there was no external evidence of its presence.

Decay which had developed in 6 of the trees was restricted to the heartwood. It extended much more slowly horizontally than vertically and was definitely localized, both above and below the inoculation chambers, to areas corresponding roughly to the shape of the chambers (Fig. 1, B). Even in spruce where the decay from the two mycelia fused, the separate rots could be distinguished by the definite cores of advanced decay. Well developed decay was typical of that a ciated with *Fomes pinicola*, the affe wood being friable and broken up i cubical blocks surrounded by myce felts (Fig. 1, A).

Fomes pinicola was re-isolated fron of the inoculated trees in which de had developed, proving that this fun was still alive and undoubtedly the ca agent of the decay.

Considering the fact that the fun was present in the host trees for 10 ye the development of decay was relativ slow, extending vertically a maximum tance of 95 inches. This is suffici

STATISTICS OF DECAY AFTER 10 YEARS IN 7 LIVING TREES INOCULA

Trees inoculated	D.b.h. when inoculated Inches	D.b.h. when felled Inches	Approximate age when inoculated Years	Source of inoculum[1]	Extent Horizontally from inoculum	Extent Upwa from inoc Incipient
Populus grandidentata	5.6	8.8	28	*Picea mariana*	0.8-1.5	1.0
Tsuga canadensis	6.5	8.0	130	*Betula populifolia*	1.5	0.0
Picea rubra	6.7	7.5	126	*Populus grandidentata*	3.0[2]	1.8
				Picea mariana		
Betula lutea	7.8	9.0	44	*Betula populifolia*	4.0	10.5
				Pinus strobus	0.2	9.0
Abies balsamea	7.8	9.0	70	*Prunus serotina*	0.0	2.0
				Abies balsamea	0.0	2.0
Pinus strobus	6.0	10.0	28	*Pinus strobus*	0.0	0.0
				Larix laricina	0.0	0.0
Fagus grandifolia	9.0	?	?	*Abies balsamea*	0.24+	?

[1]When 2 inocula were used in 1 host, they were introduced into separate inoculatio
[2]Decay from the 2 inocula were fused.
[3]Decay extended into roots.

however, to cause considerable loss of wood substance, especially if the decay is present in the butt log.

Fruiting of the fungus did not occur in any of the trees although it would seem that the region of the plugs should have afforded favorable places for sporophores to develop.[1] Therefore it appears that decay by *Fomes pinicola* may extend vertically as much as 8 feet in a tree before sporophores are produced which suggests that, where sporophores of this fungus are present on tree trunks, the decay may be much more extensive.

The mycelium of *Fomes pinicola* isolated originally from coniferous hosts was able to cause decay in non-coniferous hosts and *vice versa*. Only in yellow birch was there any indication that inocula from different sources might cause decay to develop at different rates within a single host. Unfortunately the field sheet was lost whereby it would have been possible to identify a particular inoculum when 2 inocula from different sources were placed in 1 tree. The fact

[1]On the beech host in which *Fomes applanatus* (Pers.) Wallr. had become established, a young sporophore of this fungus was present immediately beneath and in contact with the plug.

LIUM OF *Fomes pinicola* ISOLATED FROM HOSTS OF VARIOUS SPECIES

ıches Downward om inoculum ient	Advanced	Total	Presence of fruiting bodies	Fungus re-isolated	Remarks
0	3.7	29.7	None	Yes	
0	13.0	24	None	Yes	Agar liquified and still present in chamber.
	5.6	95	None	Yes	Decays fused above and below areas of inoculation. Black line present between decayed areas at places of inoculation.
3	0.2	41.5	None	Yes	Decays from 2 areas of inoculation remained definitely separated.
5	0.0	30.5			
)	0.0	2.0	None	No	Butt rot present and typical of that by *Polyporus balsameus*.
)	0.0	2.0			
)	0.0	0.0	None	No	Inoculation chambers surrounded by 0.3 inch of resin-impregnated wood. Resin partially filling chambers.
)	0.0	0.0			
	?	?	None	No	Tree died during summer of 1934. Decay by *Fomes applanatus* established in region of inoculation chamber. The decays by the 2 fungi could not be separated.

Fig. 1.—A. Cross section of a spruce trunk through areas of inoculation. Decay is typical that commonly associated with *Fomes pinicola*. B. Cross section through a birch trunk tak approximately 1 foot above inoculation chambers. C. Cross section of a white pine trunk. T inoculation chamber is surrounded with resin-impregnated wood. Decay failed to develop

that mycelia from hardwood hosts can cause decay under natural conditions in softwood hosts, and *vice versa*, is important, since it suggests that in mixed stands the presence of the fungus on the trees of one species endangers the trees of other species. Slash contaminated by this fungus (since it does persist in dead wood) is also a potential source of infection.

The fungus failed to develop in white pine and developed only very slightly in balsam apparently because of the heavily resin-impregnated wood about the inoculum. This indicates that possibly the fungus can only become established in living hosts of these species through the wood of dead branches or in injuries which are sufficiently deep to keep the heartwood from becoming impregnated with or covered by resin.

Land Utilization Bibliography

A SELECTED *Bibliography on Land Utilization, 1918-1936,* including more than 7,300 references to works dealing with problems of land utilization in both the United States and foreign countries, has been published by the U. S. Department of Agriculture.

The subject matter of the bibliography is limited to the broad aspects of land utilization and land policy. It contains references, with descriptive notes, on the classification of land; the federal land policy of the United States as developed since 1932; the land programs of foreign countries; part-time farming and subsistence homesteads; economic inventory and mapping of land preparatory to programs for land utilization; the use of land for recreation and wildlife, as opposed to the purely agricultural use of land; grazing; reclamation of land; land tenure and farm tenancy; land settlement and redistribution of population; rural zoning. References to the literature on urban land use and farm management have been omitted, and only a comparatively few references on soils and soil erosion, forestry shelterbelts, and general economic and regional planning have been included.

It is a companion volume to the *Bibliography on Land Settlement* issued by the Department in 1934 as Miscellaneous Publication No. 172, and supplements references in that publication to such subjects as agarian reform, part-time farming, and subsistence homesteads. Copies of the land utilization bibliography, which has been issued as Miscellaneous Publication No. 284 of the U. S. Department of Agriculture, may be obtain from the Superintendent of Documents, Government Printing Office, Washington, D. C., at $1.50 each.

BRIEFER ARTICLES AND NOTES

Willis M. Baker Named Chief Forester of TVA

Willis M. Baker, a member of the Council of the Society, was appointed chief of the Forestry Relations Department of the Tennessee Valley Authority with headquarters at Norris, Tenn., effective June 16, 1938.

Having been graduated from The Pennsylvania State College with the degree of B.S. in Forestry in 1914, Mr. Baker entered the U. S. Forest Service in Regi 3, where he served as forest assistant a forest ranger on various national fores In 1917 he resigned to enter the N Jersey Department of Conservation a Development as forest ranger, and r to associate state forester and super tendent of state forests. With the esta lishment of the Pennsylvania Forest R search Institute at Mont Alto in 1930, was selected as the first director. Eighte months later he was named director the Central States Forest Experiment S tion of the U. S. Forest Service at Colu bus, Ohio, which position he held un his recent appointment with the TVA.

Willis M. Baker

Mr. Baker became a Senior memb of the Society in 1920. He served chairman of the Allegheny Section 19 30 and of the Central States Section 19 35, and last December was elected to Council for the two-year term 1938-39

National Fire Protection Associati

The National Fire Protection Associat was organized in 1896 to promote the ence and improve the methods of fire p tection and prevention, to obtain and culate information on these subjects, to obtain the cooperation of its memb in establishing proper safeguards aga loss of life and property by fire. many years the activities of the asso tion were confined to municipal probl of fire safety and reduction of los These activities were attended with amazing degree of success. The asso tion has developed remarkably effec techniques for working through com tees which do an astounding amount

work on highly technical and often controversial problems involved in fire safety. These committees now number over 40 and range in subject matter from automatic sprinklers down through the alphabet to visual education.

Within recent years committees have been added on forest protection and farm fire protection. The latter committee under the leadership of Dr. David J. Price of the U. S. Department of Agriculture has an enviable record of tangible accomplishment in the field of rural protection.

At the annual convention of the association at Atlantic City in May 1938, the report of Chairman Headley for the Forest Committee presented for the approval of the association a compilation and digest of county ordinances bearing on forest fire control. This material was collected in the spring and summer of 1937 through the U. S. Forest Service and state channels. Nearly all the actual ordinances submitted came from California counties. The advancement of protection in California has given rise to an increasing use of country enactments in support of state and federal legislation and activity. It is hoped that publication of the digest of county ordinances will suggest effective and more frequent use of this method in many other states.

The Forest Committee of the N.F.P.A. is also engaged in a project of organizing state N.F.P.A. forest protection committees from the membership of the association. Such committees have been launched in the states of Mississippi, Tennessee, Kentucky, and Missouri. Earl S. Pierce, secretary of the Forest Committee, is organizing similar committees in four Gulf states.

As usual, the annual report of the Forest Committee[1] was used to convey to the membership some miscellaneous items of outstanding interest in the field of forest protection. By this means the membership of the association is kept informed on highlights of fire research and development in the fields of equipment, management, and such developments as the fire danger meter.

Both the national office of the N.F.P.A. and many of the individual members are keenly interested in the progress of forest protection and give an unstinted measure of active support to the work of the Forest Committee. With active interest and support on the part of foresters, the association should become an additional influence of national scope and considerable power for promotion of better fire prevention and all around fire control.

Roy Headley,
U. S. Forest Service.

Early Conservation Creed

Mencius, the great Chinese philosopher and savant, was born 372 B. C. It was his custom to present himself at the courts of kings and princes and there denounce vice and evil. On a visit to King Hwuy of Leang, the conversation turned to the needs of the people.

Mencius said, "If the seasons of husbandry be not interfered with, the grain will be more than can be eaten. If close nets are not allowed to enter the pools and ponds, the fish and turtles will be more than can be consumed. If the axes and bills enter the hill-forests only at the proper times, the wood will be more than can be used. When the grain and fish and turtles are more than can be eaten, and there is more wood than can be used, this enables the people to nourish their living and do all offices for their dead, without any feeling against any. But this condition, in which the people nourish their living, and do all offices to their dead without having feeling against any, is the first step in the Royal way."

[1]Copies of this report may be obtained from the managing editor of the Journal of Forestry.

(Translation into English by James Legge.)

Here, three hundred years before the birth of Christ, expression was given by Mencius to the fundamentals of conservation which are basic today. Is there an earlier recordation of these concepts in any country or do they constitute an additional bit of wisdom which must be accredited to the land of Confucius?

D. F. McGowan,
Washington, D. C.

Dodder Damages Black Locust Seedlings at a Pennsylvania Nursery[1]

During the summer of 1935 observations were made on a case of dodder infection on first-year seedlings of black locust (*Robinia pseudoacacia* L.) in a forest nursery at Mont Alto, Pa. By the middle of August a number of infection spots had developed, each covering 8 or more linear feet of bed. The dodder spread rapidly and formed a dense tangle, parasitizing practically every seedling in the infected spots. The affected seedlings attained an average height of 2 feet or less, before most of them were finally killed in late August, as compared to 3 feet or more for the unaffected seedlings; the loss was approximately 2.6 per cent of the total production of this species. The trees in the infected spots and to a distance of a foot outside were cut off at the ground line at that time and burned, and no further spread of the disease occurred.

The dodder was identified as *Cuscuta arvensis* Beyrich and typical specimens were deposited in the Botany herbarium at the University of Pennsylvania. A recent note by Latham, Baker, Hartley, and Davis, which has been accepted for publication in the *Plant Disease Reporter*, recorded dodder of unidentified species o black locust in Maryland, Illinois, Mi souri, Kentucky, and Arkansas and a earlier note listed it on *Robinia* sp. i Washington. An Illinois nurseryman ap parently controlled the dodder witho destroying the seedlings, by combing i fested black locust beds with a speciall designed rake.

Dodder is frequently introduced into field as a contaminant in leguminou cover-crop seeds. In the case at Mon Alto, clover had been grown on the so the preceding year. Cover crops grow ahead of susceptible tree species shoul be watched and any dodder which appea should be eradicated before it has tim to produce seed.

L. W. R. Jackson and F. Kaplan,
Division of Forest Pathology.

Forest Tree Breeding Technique

Inquiries are received from time to tim on the technique used in the breeding forest trees. The methods employed the controlled breeding of forest speci are essentially the same as those used the breeding of agricultural and hor cultural plants. Plant breeding was recognized art long before the fund mental principles of genetics were d covered. Since a scientific background not an absolute requisite, it is hoped th the following description of the relative inexpensive materials and simple tec nique involved may stimulate addition interest in the breeding and hybridizati of forest trees.

Briefly stated, controlled breeding r quires protection of the female flowe from chance pollination both before a after the desired pollination has be made. This is usually accomplished

[1]Division of Forest Pathology, Bureau of Plant Industry and Civilian Conservation Corps cooperation with the Allegheny Forest Experiment Station and the University of Pennsylvania, Phi delphia, Pa.

covering the unopened female flowers with paper, cellophane, or cloth bags. In the case of monoecious trees such as the oaks where the male and female flowers are separate but are borne on the same tree, it is necessary to remove the male flowers from the portion of the branch that is to be bagged. If the tree bears perfect flowers (male and female parts in the same flower), then the stamens which produce the pollen must be carefully removed from the flowers before they mature. Emasculation is not necessary if it is known that the tree is self-incompatible (that it will not set seed to its own pollen), or strongly dichogamous (that the male and female flowers, or flower parts, mature at different times). With some species it is perfectly safe to remove the bag during the pollination operation, but in the case of wind-pollinated trees such as the birches, there is sometimes considerable danger of contamination by this procedure, particularly if male flowers on the same tree are shedding pollen.

Pollen is usually collected from flowers on cut branches which are brought into the laboratory a day or more before the flowers mature. The branches are kept in water and the pollen is collected as it is shed. The pollen is kept in small shell vials stoppered with plugs of absorbent cotton (Fig 2); the vials are stored in desiccators, airtight glass jars containing a small amount of calcium chloride (Fig. 1). Pint jars containing a layer of calcium chloride covered with a layer of absorbent cotton are entirely satisfactory for field desiccators, and they can also be used for storage. Special storage methods have been developed for the pollen of some plant species but, in general, storage over calcium chloride is suggested where no specific methods have been described. Since the pollen of some forest tree species remains viable for only a short period of time when stored in calcium chloride desiccators, research on better storage methods is urgently needed.

In the breeding work at the Northeastern Forest Experiment Station glassine bags are used to cover the flowering branches. The bag is tied securely over a bit of cotton wrapped around the stem to prevent the entrance of pollen and to

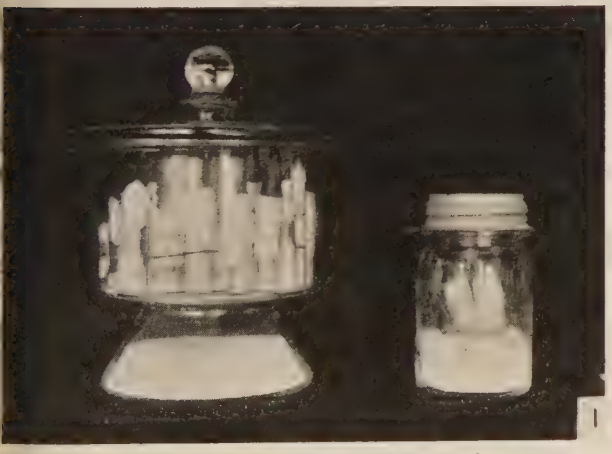

Fig. 1.—At the left, a desiccator used for the storage of pollen. The white substance in the base is calcium chloride. At the right, a pint jar used as a field desiccator. The calcium chloride is covered with a layer of absorbent cotton.

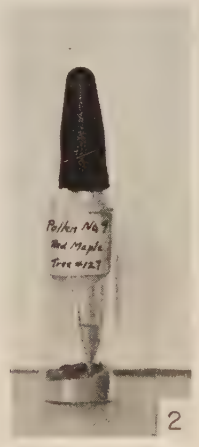

Fig. 2.—The pollen is kept in small shell vials properly labeled and stoppered with cotton. A separate medicine dropper drawn out to a fine point is used with each lot of pollen.

Fig. 3.—A glassine bag is placed over the branch bearing unopened flowers. This is then covered with a kraft paper bag for protection against mechanical injury. The cotton prevents pollen from entering the bag and keeps the bag from slipping along the branch.

Fig. 5.—After the pollination has been made the hole in the glassine bag is covered with a piece of adhesive or by a second glassine bag. The kraft paper bag is then replaced.

Fig. 6.—The branch is properly labeled, and the bags are left in position until the female flowers are past bloom (i.e. until

eep the bag from slipping (Fig. 3). A raft paper bag is then tied over the lassine bag for mechanical protection. ellophane bags are more satisfactory in ome ways than glassine, but they are iore fragile, more expensive, and more ifficult to obtain in a variety of sizes. he size of the bags used depends upon ie species; they should be large enough o allow for shoot and leaf growth.

When the female flowers are ready for ollination, the glassine bag is punctured nd the desired pollen is blown directly n the flowers by means of a small medi- ine dropper which has been drawn out o a fine point (Fig. 4). These droppers r pipettes are cheap enough to be used or one kind of pollen and then discarded o prevent contamination of a new lot.

After the pollination operation has been ompleted, the pipette puncture in the lassine bag is covered with a small piece f adhesive or a second glassine bag is ed over the original (Fig. 5). The raft paper bag is then replaced and the ags are left in position until the flowers re past bloom (Fig. 6).

This procedure has several advantages: . It requires comparatively inexpensive quipment; 2. The short pipettes can be ept in the vials, and by using individual ipettes for each kind of pollen there is ttle danger of contamination; 3. The emale flowers are adequately covered rom the time of bagging until they are ast bloom. There is little chance for ontamination through the small hole hich is made in the glassine bag during ie brief pollination operation.

Complete records should be kept of all reeding operations. Flowers and seeds ould be so labeled that the male and emale parent trees become a matter of ecord and that it will always be possible o know the parentage of all offspring. It is only from such records that future breeding work can be planned and directed toward the improvement of specific characters.

ERNST J. SCHREINER,
Northeastern Forest Experiment Station.

GRAZING HABITS OF RANGE CATTLE[1]

In order to work out the most effective plans for managing the range it seems only natural that one first study the cattle as they graze naturally on the range, observing what they do and, in so far as possible, why they do it.

In 1934 a study of this nature was started on the Santa Rita Experimental Range.[2] To date, the observations have covered one complete year and two additional summer growing seasons. The main objectives of the study were to learn: First, something of the preference by cattle for different forage plants; second, more of the general grazing habits of cattle; and third, some of the factors that influence cattle preference for different range plants, as well as their general grazing habits.

FORAGE PREFERENCE

As used in this study, the term "preference" refers to the selection of different range plants by cattle. Four degrees of preference were used: (1) definite selection; (2) indiscriminate use; (3) occasional use; (4) little or no use. In the course of a year any particular plant might fall into one or all of these groups as judged by the way that cattle were eating it at the time of each observation.

As regards preference most of the Santa Rita grasses and many of the shrubs were grazed rather consistently through most

[1]Research Note 21, Southwestern Forest and Range Experiment Station.

[2]A branch of the Southwestern Forest and Range Experiment Station located about 35 miles uth of Tucson.

of the year. There were, of course, times of the year and certain localities in which some plants were definitely selected. Other instances were recorded where individual animals showed rather definite preferences.

Such grasses as California three-awn (*Aristida californica*), slender grama (*Bouteloua filiformis*), sprucetop grama (*B. chondrosioides*), hairy grama (*B. hirsuta*), rothrocks grama (*B. rothrockii*), side-oats grama (*B. curtipendula*), and curly-mesquite (*Hilaria belangeri*), together with such browse plants as guajilla (*Calliandra eriophylla*), and range ratany (*Krameria glandulosa*) were grazed indiscriminately through most of the year. Notable exceptions were the selection of California three-awn during the winter and late spring and of slender grama in midwinter and late summer.

Cottongrass (*Trichachne californica*) and wild millet (*Chaetochloa grisebachii*), were selected through most of the year except for short periods during the summer and spring when they were used indiscriminately.

Black grama (*B. eriopoda*) was alternately selected and indiscriminately grazed throughout most of the year. Tanglehead (*Heteropogon contortus*) was selected through mid and late summer and early winter and indiscriminately grazed the rest of the year. Annual grasses (chiefly *Bouteloua aristidoides* and *Aristida adscensionis*), were grazed indiscriminately throughout the periods that they were available, and in a few instances were actually selected. For the most part annual weeds were grazed indiscriminately whenever they were available; though at times some of them, such as California-poppy (*Eschscholtzia californica*) and indianwheat (*Plantago sp.*) were selected. Mesquite (*Prosopis velutina*) was grazed but lightly during the early summer and early spring; definitely selected during late summer and late spring; and grazed indiscriminately at the other seasons. Catclaw (*Acacia greggii*) was selected in the late spring and alternated between indiscriminate and rare use at other time of the year. Other shrubs were used i varying degrees; although for the mos part rather moderately.

CATTLE HABITS

Cattle were found to have rather def nite grazing periods during the day. I the summertime from around 5 to 9:0 in the morning, and from about 4:0 until dark, or about 7:30 in the evening in the winter from 6:30 or 7 o'clock t 10:00 or 10:30 in the morning, and fro 3 or 4 o'clock to 6 or 6:30 in the evening The spring grazing hours were much th same as for the summer except for th fact that the evening period was usuall longer, sometimes lasting as late as 1 o'clock at night. On the average the tota time consumed in grazing during the sum mer and winter amounted to between and 8 hours a day; whereas during th spring it averaged around 9 hours.

Some cattle alternated between eatin salt and drinking water, others drank on then ate salt, or vice versa, and left. Mo cattle watered daily in the morning though some varied from this by wate ing in the afternoon. About 10 minut time appeared to be necessary for a co to drink all the water she wanted an about 15 minutes were required for eatin salt. Many old cows, however, mono olized a block of salt for much long periods of time.

During the cold part of the winter, portion of the spring, and again in ear summer, cattle tended to graze up an down the washes. At other season th grazed more or less at random over th range. Cold, stormy, or windy weath often caused cattle to be more restle and to cover larger areas while grazing

When feed was abundant, cattle tend to graze conservatively but when it b gan to get short along in the spring th grazed more closely and under extrem conditions would graze down to with three-quarters of an inch of the ground.

FACTORS INFLUENCING GRAZING HABITS

Some of the factors that influence the habits of grazing animals, while not new, may serve to give a slightly different approach to the range management problem. The rather consistent use of mesquite during winter, late spring, and part of the summer seemed related, in a measure at least, to temperature conditions. During winter cattle naturally sought the shelter of mesquite trees as protection from cold; during the spring from wind; and in the summer from the intense heat. Mesquite, being the nearest forage available under these conditions, was eaten more than at other seasons of the year. The rather consistent use of grasses along the washes during the fall was due to the fact that growth remained green in such places after it had cured on the ridges. Grazing along the washes during early spring and summer was accounted for by the fact that the first green growth starts in such places.

At the start of the summer growing season many of the first rains are localized; this caused cattle to concentrate on local areas for short periods.

Extreme drouth periods, especially in the spring of the year, during which there is little or no green grass, were the chief factor in causing cattle to eat such plants as cholla (*Opuntia sp.*) and prickly pear (*Opuntia sp.*)

SUMMARY

Some of the following suggest ways whereby range management practices may be improved.

1. Range areas on which annual grasses and weeds are the dominant vegetation should be grazed so as to secure full use during the summer and spring growing seasons.

2. Areas where any of the following grasses, tanglehead, cottongrass, or california three-awn, are dominant can be grazed to best advantage during the winter and late spring, since they normally furnish a relatively greater amount of green feed at these seasons than most other range grasses.

3. Black grama areas are chiefly valuable for grazing during the winter or spring and do best when protected or given but light use during the summer growing season.

4. Mesquite and catclaw areas can be grazed to best advantage during the winter when they furnish protection against the cold winds and again during the late spring when they provide shade as well as succulent feed at a time when most forage grasses are dry.

5. Guajilla and range ratany are relished by cattle throughout most of the year; however, where abundant they can be used to best advantage during the spring when perennial grasses are dry or largely grazed off.

6. Most of the remaining common grasses and small shrubs are grazed by cattle with equal relish throughout the year and no particular advantage is to be gained by attempting to use them at any specific season.

7. Lack of adequate salting may have its serious side since cattle deprived of salt may attempt to satisfy their craving at a dirt salt lick and not infrequently die as a result.

MATT J. CULLEY,
U. S. Forest Service.

JEPSON'S MANUAL AGAIN AVAILABLE

Jepson's *Manual of the Flowering Plants of California*, which has been out of print for some months and therefore caused some concern among botanists to whom a manual is indispensable, is again available. Dr. Willis Linn Jepson is well known to foresters of California for his great treatise, *Silva of California*. He gave some of the first lectures on forestry in

the state and gave important aid in the founding of the school of forestry at Berkeley.

The second printing is in a superior binding, making this, a large book of 1,253 pages, more durable for field use. Those to whom the original price of $7.50 was an obstacle to ownership will be pleased to know the price has been reduced to $5. Sales are handled by the Associated Students Store, Campus, Berkeley, California.

For more than 10 years this Manual has been the authoritative source for scientific and general information on the trees, shrubs and herbs of California. A 16-page general key to the families is supported by other keys for each family and each genus. The 1,023 illustrations add materially to the value of the book.

Of particular interest to the student of ecology is the prefatory "Outline of Geographic Distribution of Seed Plants in California" which is an essay on the origins and contents of the California flora and a discussion of the concept of genera and species.

Since the flora of neighboring states is similar in many respects to that of California, the Manual has wider than one-state interest and use.

Emanuel Fritz,
University of California.

Range Recovers Under System of Management

Conservative use is one of the most potent panaceas for depleted western range as evidenced by results of studies made from 1933 to 1936 at the Desert Branch Experiment Station in western Millard County, Utah. Under conservative use forage production has almost trebled on the winter range during that time.

Before the experimental plots were fenced in 1933 the entire range was grazed heavily and conditions were similar throughout the area. Since fencing the experiment station range has been stocked at the rate of approximately two surface acres a month for each sheep except in 1934-35 when winter precipitation was low. No plan of management has been adopted by users of the outside range.

The most striking recovery and improvement occurred with the most palatable and better forage plants. Ricegrass produced 62 pounds of forage per acre on the managed range while it produced only 10 pounds on the open range. Counts showed that this grass has suffered a 17 per cent mortality on the open range and 5 per cent on the managed area. Moreover, 1,000 plants on the open range produced only 7 pounds of forage while the same number of plants on the experimental range produced 33 pounds.

In the case of the Warm Point enclosure, since the beginning of protection in 1932, ricegrass has increased 166 per cent in density; whitesage 115 per cent; while curlygrass shows no marked change in either the protected or outside range. At the Woods Well enclosure ricegrass has almost disappeared from the outside area, while on the inside it increased 4 per cent; curlygrass decreased 50 per cent on the outside but increased 70 per cent under protection; and whitesage decreased 11 per cent on the outside but increased 30 per cent within that fence.

REVIEWS

Holy Old Mackinaw. A Natural History of the American Lumberjack. By Stewart H. Holbrook. *viii+278 pp. The Macmillan Company, New York. 1938. $2.50.*

Three hundred years ago the lumber industry had its rude beginning in North America. A century or so later the most stalwart pines of New England were marked with the King's broad arrow for exclusive use of the British navy. Since then, the axes of men have drummed a relentless and rhythmical march across the continent to the Great Lakes pineries and on to the long-log country bordering the Pacific Ocean. Along this route the lumberjack, a pioneer in his own right, was at once the most dominant and picturesque element of the industry.

Academic historians, reports Mr. Holbrook, have not accorded the hewers of wood their just place in the sun. Loggers as a sturdy race of "he-men" are vanishing rapidly from the American scene, and it is time that the exploits of lumberjacks at work and play be recorded. In this book the author seriously essays to accomplish this purpose, not neglecting in the telling that gusty spirit which the general reading public has come to associate with bunkhouse and camp through the writings of Mr. Holbrook himself, James Stevens, Esther Shepherd, and others. The industrial migration with which Mr. Holbrook deals is restricted to the northern timber belt; southern pine and cypress are beyond his intimate acquaintance.

Social life in camp and town occupies a large share of the author's attention. In the modern era roads, radio, marriage, and motion pictures have greatly increased the opportunities for enjoyment. Until recently, however, the logger in camp resorted to tall tales and lengthy ballads from the deacon seat around the bunkhouse stove. Mr. Holbrook devotes one chapter to songs, tracing some of them from Maine to Oregon. As to the tales, there are many scattered throughout the book. That of Jigger Jones is typical in that it stems from a true character whose activities have assumed mythical proportions. It was the Jigger who "would walk a falled spruce, barefoot, and kick off every knot from butt to top."

Special emphasis is given to the infrequent but monstrous pleasures the lumberjack enjoyed in towns catering to white-water men and loggers. "Booze, bawds, and battle" are described as the ultimate goals of oldtime woodsmen. In battle the logger was quite self-sufficient; for his liquor and scarlet women he relied upon purveyors in towns fringing the forests. The delights of Bangor, Muskegon, and Seattle, with neighboring centers in each section, are enlarged upon in lusty detail.

Work as well as play comes within the scope of Mr. Holbrook's study. Clear and adequate accounts are given to the hierarchy of the woods crew in its evolution from the simple to the complex. Development of tools from the ubiquitous peavey to power skidders and tractors is presented concurrently with the rise and fall of the unique race of loggers whose picturesqueness has declined proportionately with the advance of the machine age in logging. Terminology in woods and camp, varying with migration and with the years, is warp and woof of the author's story, but there is also appended

a "Loggers' Dictionary and Compendium of Useful Knowledge."

The background of logging activity is the movement of capital from section to section. Investors who sighted the end of "inexhaustible" supplies of timber in Maine, sought vast areas in new pineries and eventually acquired holdings of redwood or Douglas fir. The Bingham who bought over two million acres in Maine at 12½ cents an acre had his peers in the Isaac Stephensons of the Lake States and the Weyerhaeusers of the Coast.

In all these matters—the lumberjack's social life, his work, and his tools, his employers and their domains and philosophy—Mr. Holbrook has a thorough understanding of regional differences. Conversion of standing timber into merchantable logs has been the lumberjack's constant purpose across the continent. Accomplishment of this purpose has differed in approach and method because of local conditions in the various sections, and because of external economic conditions. The latter Mr. Holbrook touches lightly, and as it deals with the economics of the lumber industry more than logging, it is truly without his province. But the reader will relish the contrast and comparison of the author as to the regions along the path of the industry.

A reviewer risks accusations of pedantry in minute criticism of a book designed to amuse fully as much as to instruct. On page 21, however, the date of the Webster-Ashburton Treaty is given as 1839. In that year the Aroostook War might be said to have ended, but Lord Ashburton did not arrive until the spring of 1842, and several months later the treaty was signed. The establishment of the Hudson's Bay Company mill at Fort Vancouver may be dated definitely at 1827 rather than "about 1820" (p. 165). Details of the famous rescue by E. C. Pulaski in the Idaho fire of 1910 (p. 241) may be corrected from the hero's own story in *Rangers of the Shield*, edited by Ovid Butler.

Footnotes appear in the book, but they are solely of the informative type. Author and publisher might have compromised with their more critical readers on a few controversial subjects by the employment of source citations. Historical "firsts" are of this nature, as "the first sawmill in America" (p. 29), the early use of the circular saw (p. 39), and felling by saw (p. 102). Likewise, the appended bibliography reveals only a portion of the literature which Mr. Holbrook must have read and which is available on the subject. A comprehensive list would consume many pages without adding to the salability of the volume and perhaps the nature of the book does not demand a complete bibliography. Those seriously interested in forest history, however, would appreciate its publication, separately, if need be, in some technical journal.

The tone of the book is nostalgic. To agree in the extreme with Mr. Holbrook that the good old days in the lumber industry were best is to deny most of the benefits from improved social and economic conditions conceded to the modern logger. Yet the author has produced what he set out to do, "A Natural History of the American Lumberjack." He writes with the knowledge of one who has known the woods life first hand, in camps as far apart as Vermont and British Columbia. One will find little of Paul Bunyan (his name is not in the index!) because Paul was of less stature in logger lore than his biographers have led us to believe. One will find emphasis on booze and bawds and battle because the author found the emphasis so in real life. Mr. Holbrook writes in substance and style long since tested and approved by readers of trade journals and national popular magazines. Pleasant reading and a factual handbook will be the rewards of the possessor of *Holy Old Mackinaw.*

EDMOND S. MEANY, JR.,
The Hill School.

Drainage Basin Problems and Programs. By the Water Resources Committee of Drainage Basin Studies in the United States, of the National Resources Committee. *540 pp. U. S. Govt. Printing Office, Washington, D. C. 1937. $1.50.*

This assignment of the Water Resources Committee had three major objectives: (1) to determine the principal water problems in the various drainage areas, (2) to outline an integrated pattern of water development and control designed to solve those problems, and (3) to present specific construction and investigation projects as elements of the integrated plan. As a means of accomplishing these objectives, the country was divided into 14 regions, for each of which qualified engineers submitted their findings and recommendations as a basis for the committee report.

Emphasis is placed on the need for a coordinated federal water policy to include not only water, but also the many related elements of public interest and welfare. One suggested item of policy calls for the treatment of complete drainage areas from source or rim to mouth. Another item suggests obviating controversies by substituting facts for opinions.

The investigations and projects suggested are arranged in three groups for each region, with corresponding priorities. The 11 types of projects considered include—to mention only those which are closely related to forestry, bank erosion control, flood control, recreation, soil conservation and forest development, and wildlife conservation.

It is recognized by the Committee that the use and control of water merges into land use and planning. Apparently, this was reflected in the individual basin reports, especially in connection with soil erosion and forestry. These "collateral" subjects are admittedly treated very briefly, although the importance of both subjects is recognized. Quoting from the report, "Precise knowledge is lacking concerning many of the quantitative relationships involved. Unbiased scientific research is particularly needed to determine in representative areas of considerable size the relationships of vegetal cover and cultural practices to yields of water. The research should be undertaken cooperatively by the various agencies concerned with the problem, thus insuring diversity of viewpoint in both the collection and the interpretation of data." The attitude of the Committee toward forestry in relation to water and their reason for minimizing forestry and other land use measures in their programs may be clearly seen.

In a brief section headed "Recommended National Data—Collection and Investigation Projects," one is included for the collection of basic hydrologic data, including precipitation, snow surveys, streamflow, and evaporation. Although not saying in so many words, there is included here an item of $500,000 annually for research on the relation of forests to water. Another project is entitled "Vegetal Cover and Soil Erosion Control," and proposes; "Quantitative studies of the effect of vegetal cover and soil erosion upon hydrologic phenomena with particular reference to silting of reservoirs and streamflow. Annual cost for five-year period, $250,000."

The bulk of the report is concerned with the regional problems and programs and those of individual drainage basins. Proposals of projects for flood control are numerous and expenditures of many millions are recommended. With rare exceptions, the works proposed are dams for reservoirs or channel improvements such as levees. In the North Atlantic region, "retarding dams in the headwaters" are included in a project for flood control. This is almost the only instance of a flood control project above the lower reaches of major streams.

Control of soil erosion and the need of investigations of the relation of ero-

sion to water utilization are mentioned in the text for the Piedmont regions, but no project of investigation is listed. In the Southeastern region, the subject is dismissed with the statement that "surveys are lacking for remedial work related primarily to water conservation." One small project for soil erosion control in the Santee River basin is proposed and a $2,000,000 project for erosion control and water conservation is included for deferred construction in the Savannah River basin. In the Tennessee Valley, soil erosion control and forestry are mentioned as complementary to the river regulation activities of the T.V.A. A $1,000,000 project is recommended for a study of the problem of silt and its sources in the Colorado River basin. Soil conservation and forestation of submarginal lands are mentioned as collateral needs in the Red River basin.

Small dams for water conservation, wildlife, recreation, and livestock are recommended in small projects for the basins of the Missouri, Upper Mississippi and Red River of the North.

Studies of consumptive use of water, including transpiration by vegetation are proposed for the Upper Rio Grande and Colorado River basins.

Only two specific projects in the whole list seem to involve forestry directly. One is in southern California where "forest destruction has adversely affected streamflow" and "forest protection in critical watershed areas is essential." A project for immediate action to protect forest and brush cover from fire under plans prepared by the U. S. Forest Service is recommended, to cost $313,000 annually.

The second is in the Lower Mississippi valley where large areas subject to backwater cannot be made safe for human occupancy by flood protection, drainage, and associated measures. These lands are largely forested and "they function effectively during floods as huge natural retarding basins." The committee considers that this is their highest use and that they might well be incorporated in national forests. A project of seven million dollars is recommended for acquisition of these lands for national forests and game preserves under existing legislation.

One of the major objectives of the assignment was to outline an integrated pattern of water development and control, but, with a few minor exceptions, the projects listed do not include the smaller tributaries and headwater areas. The Committee emphasizes the need for a coordinated federal water policy, including related elements of public welfare, but largely neglects the possibility of including in the plan of coordination an agency like the Forest Service which is devoting much effort to water development and control in areas of natural forest or other vegetation at the headwaters of many of the basins concerned. Nineteen federal agencies are listed as having participated in the study, including the Forest Service. The Secretary of Agriculture is a member of the National Resources Committee, but no forester is represented on that or on the Water Resources Committee. The chiefs of the Soil Conservation Service and of the Biological Survey are represented on the latter committee and their influence may be suspected in the frequent references to measures in behalf of wildlife and erosion control. Forestry is thus represented neither on the Committee, nor in the list of consultants and staff members.

The reasons are not difficult to see. The report makes it plain by various references that forestry is considered a collateral subject and that the influences of forest vegetation are uncertain or unknown. This attitude on the part of the predominatingly engineering personnel of the Committee doubtless results from two causes. One is that foresters have up to the present time produced little reliable quantitative information on this subject; and the second, their statements are viewed with suspicion by many engineers because of ill-advised claims in former years

which were not adequately supported. The situation has changed rapidly in the last few years and large amounts of quantitative data are accumulating, although little of it has yet been made available in print. As these data become available, foresters will be in a stronger position to support their claims for representation on this or similar committees concerned with soil and water conservation.

The findings of this report, dealing almost wholly with major streams, are strangely lacking in coordination with the previous report, *Little Waters—A Study of Headwater Streams and other Little Waters, Their Use and Relations to the Land*, which was published in 1936, also under the auspices of the National Resources Committee. In transmitting that report to the President, the Chairman of the Committee emphasized the necessity of utilizing and controlling small streams as a means of utilizing and controlling great ones. The President transmitted the report to Congress with similar emphasis on the importance of the headwaters. Greater application of the principle of coordination in water development and control would seem to be justified in the activities of the Water Resources and other committees of the National Resources Committee.

J. Kittredge, Jr.,
University of California.

Insect Enemies of Western Forests. By F. P. Keen. *U. S. Dept. Agric. Misc. Pub. 273. 209 pp., 92 figs. 1938. 25 cents.*

This splendid publication will be enthusiastically welcomed by all those engaged in either forest protection or wood utilization work. The following portion of the preparatory statement by Dr. F. C. Craighead, of the Division of Forest Insect Investigations of the U. S. Bureau of Entomology and Plant Quarantine, summarizes the basis and purpose of this bulletin:

"For many years entomologists of the Bureau of Entomology and Plant Quarantine engaged in the study of forest-insect problems have considered compiling the great mass of records in their files so that it would be in more usable form. There has been a growing need for a manual or handbook for use by forest rangers and others entrusted with the administration of forest lands and the prevention of insect losses. Recently the tremendous impetus given to forest conservation by the establishment of the Civilian Conservation Corps camps has made insect control an actuality in many forests where previously it had been impractical. This called for the instruction and education of these men and of their leaders and has crystallized efforts toward bringing together the material in this handbook. In compiling this manual all sources of information have been drawn upon to make the presentation as comprehensive and up to date as possible. Published bulletins, records in the files, unpublished work of field men, and previously mimeographed manuals or instructions issued by the leaders of the forest-insect field laboratories of the Bureau of Entomology and Plant Quarantine in the western states have been used as needed."

The author deserves commendation for the care and accuracy with which he has done his work. The fact that he is a forester with an intimate knowledge of forest conditions throughout the West, as well as an entomologist with 25 years of experience in forest insect research and control, has resulted in a manual which is particularly practical and sound in its outlook.

The reader will be pleased to find an index of host trees and the division of the more important host trees into insects attacking bark or cambium, cones or seeds, needles, roots, twigs or branches, and wood. Such an index will be espe-

cially helpful to those readers who are not familiar with the forest insects of the West. In addition, there is a general index sufficiently detailed for all purposes and a good bibliography.

The author has avoided much repetition by dividing his discussion of the insects into those affecting seed production, those injurious to seedlings—nursery or forest, those injurious to young trees, and those attacking mature trees. Then there are sections on insects infesting wood and forest products and those insects injurious to forest range plants. In addition, there are sections devoted to such general subjects as natural control factors, silvicultural control, biological control, direct or remedial control, etc. The numerous detailed keys to the recognition of the insects by the character and appearance of the injuries will be found indispensable.

The reviewer predicts that the limited edition of the publication in the hands of the Superintendent of Documents will be exhausted within a year.

A. J. Jaenicke.

Das Plenterprinzip in der Schweizerischen Forstwirtschaft (The Principle of the Selection System in Swiss Forestry). By Walter Ammon. *808 pp. Illus. Beiheft 17 zu den Zeitschriften des Schweizerischen Forstvereins. Buchdrückerei Büchler & Co., Bern. 1937.*

This publication is a welcome contribution in these days when the term selection system is so widely and so promiscuously used. Ammon is especially well qualified to write on this subject, for he is looked upon as one of the foremost foresters of Switzerland and writes from a rich experience acquired during thirty years of managing selection forests in the district of Thun in the center of Switzerland. Written by a practicing forester rather than a teacher, the publication has in places a strong local flavor. Nevertheless the reviewer often had the impression that he was listening to the late Professor A. Engler of Zurich lecturing on silviculture. Ammon's views merit attention because they are based on an intimate practical knowledge of forests which have been successfully managed under the selection system for many years. There are few people in the world who can write on this subject with similar authority. The reader looks here in vain for such absurd theories as the favorite textbook sentence that in the ideal selection forest each age class should occupy the same amount of space.

The text is divided into six chapters:

I. The renaissance of the selection principle
II. Conception and scope of the selection principle
III. Structure, development and growth of the selection forest
IV. Management
V. Economic production
VI. Outlook of silviculture in Switzerland.

The discussion in the second chapter of the differences of the true selection system, the group selection system, the various forms of clear-cutting systems, and the intermediate forms resulting from the conversion of even-aged working units into selection stands is especially interesting. The aim of the selection system is to obtain the best increment continuously on the whole area. This means continuous stand improvement. What is left after the cut is more important than what is cut. The trees, soil, and air form one producing unit. Not the stand, but the current annual increment is harvested. This is the main point which distinguishes the selection system from the other systems, where the soil is considered as the producing capital and the product is the final stand of trees at the end of the rotation. The forester should strive to establish a balanced distribution of the trees by volume classes over the whole area. Ammon, however, is very emphatic in his state-

ment that rigid rules or mathematical formulae cannot be set down for normalcy. The quantity and quality of the increment must be the sole arbiter over the skill of the manager.

Regarding the factor of time in the selection system, Ammon states at the end of the third chapter that the age of the tree has no direct economic significance. It is not a question of the trees getting older, but of the trees getting bigger. Neither can a rotation nor a production period be recognized because the stand is continuous and always the means of production, never the product. As a spring furnishes a steady amount of water, so does the selection forest produce a steady amount of wood. The current annual increment constitutes the only useful unit. The control method as developed by H. Biolley is therefore used for regulating the cut.

Ammon's conception of the selection forest varies considerably from that generally presented in textbooks. A choice selection of 15 excellent photographs illustrates the publication.

R. Stahelin,
Rocky Mountain Forest and Range Experiment Station.

Collecting and Handling of the Seeds of California Wild Plants. By N. T. Mirov and C. J. Kraebel. *California Forest and Range Exp. Sta. Research Note 18. 27 pp. (Mimeographed) Berkeley, Calif. 1937.*

This report makes available the results of several years of experimentation on the handling of the seeds of 255 native California plants. The studies were undertaken as part of a much larger study of the revegetation of burned or otherwise unprotected slopes in the southern California mountains where non-forest types predominate and where watershed protection and erosion control are of paramount importance. The revegetation of freshly exposed road slopes—cuts and fills—received attention also. For plants the authors had to go to the non-arborescent forms—shrubs, herbs, and even grasses. However, a few arborescent species—native oaks, walnuts, sycamore, etc. —were used.

Seven pages are devoted to notes, suggestions, and cautions concerning seed collection, extraction, germination, storage, and treatment of refractory seed.

The principal contribution is modestly placed in an appendix, which required 17 of the publication's 27 pages. In it are listed seed and cultural data for the plants: time of seed collecting; approximate number of seed per pound (ranging from 10 for California buckeye to 22,000,000 for monkey flower); number of days elapsing between sowing and germination (ranging from 2 for the freshly collected seed of a lupine to 232 for previously stratified California nutmeg); and highest germination per cent obtained (this ranged from less than 5 per cent for several species to 100 per cent for others like Ceanothus, dogwood, etc.). It is interesting to note the high germination of many of the brush species. Recommendations for seed treatment and culture are made for each species.

The germination tests and studies were made in the greenhouses of the University of California. The information given is invaluable to those charged with large-scale revegetation of watershed slopes.

Emanuel Fritz,
University of California.

The C.C.C. Through the Eyes of 272 Boys. By Helen M. Walker. *94 pp., 8 charts. Western University Press, Cleveland, Ohio. 1938.*

This is the first publication yet seen based on a social science study of the Civilian Conservation Corps and as such

is of unusual interest. The author is Associate Professor of Family Case Work in the School of Applied Social Sciences of Western Reserve University. The report is a summary of a group study of the reactions of 272 Cleveland boys to their experience in the C.C.C., based on original material collected by 10 graduate students (5 men and 5 women) at the University. The headings or chapters are: Introduction, Reactions with Regard to Specific Aspects of Camp Life, Termination of the Camp Period, Employment Adjustment Subsequent to Camp Experience, and Conclusions. The 12 tables and 8 charts point up the study and in their condensed form present illuminating conclusions even without the clear-cut text.

The material used was based on an outline or questionnaire covering 41 main points or questions, the answers to which were obtained by personal interviews with the ex-enrollees. Some 20 pages of the bulletin consists of quoted extracts from the case workers' original reports on individual boys, which thus have the advantage of being first impressions.

Of the 272 Cleveland boys, more than 45 per cent were of foreign-born parents. Of these, Slavic races lead with 55.0 per cent, Italians were next with 15.6 per cent, Hungarians with 11.7 per cent, Germans 9.7 per cent, and miscellaneous racial strains 7.8 per cent. This selection of racial strains was not purposely made but was typical because almost all of the 6,500 discharged boys from Cuyahoga County had come from relief families and many of these relief families were of foreign extraction. Nor were all the 272 boys contacted sent to Ohio camps; many went to Idaho, Oregon, California, Montana, and Utah. Their reactions to camp life, discipline, meals, the work, study courses, Army officers, foremen, educational advisers, etc., are very illuminating, and in many cases quite to the point. In a large majority, they expressed themselves as profiting in many ways from their C.C.C. experience, and as favoring continuance of the Corps. Most of them spoke highly of their Camp commanders and even higher of the superintendents and foremen; their opinion of the educational advisers and school work was not so favorable. An interesting point is that the boys who said that they got little or nothing out of their experience and who were most critical of the Corps, were the ones who took no study courses, took no part in camp athletics or camp life, and went on no recreational trips; incidentally, for the most part these were the boys who were still jobless when interviewed.

This study of ex-enrollees is a most interesting one and has much to commend itself to everyone concerned in supervisory functions of the Corps. It is a little surprising that with the Corps now in its fifth year, with camps in every state in the Union (and each camp a potential social laboratory) and under the very noses of colleges and universities, there has been apparently so little attempt by social research workers to study the C.C.C.

Jno. D. Guthrie,
Civilian Conservation Corps.

Forest Trees of the Pacific Coast. By Willard Ayres Eliot, assisted by G. B. McLean. *565 pp. 248 illus. G. P. Putnam's Sons, New York. 1938. $5.*

For most of the forest regions of the country there has been for some time a popular, illustrated book, descriptive of the local trees, but until now the Pacific Northwest had lacked such a book. That want is now admirably satisfied by a substantial volume, profusely illustrated with tree portraits and photographs of foliage and fruits, describing in non-technical and interesting fashion all the trees native to Alaska, British Columbia, Washington, and Oregon.

The book is intended primarily to help the layman identify the trees by sight. Material of former workers, particularly Sudworth, has been fully used and acknowledged, but it has been largely supplemented by the author's own observations and research. The book is commendably free of errors. The nomenclature used in the Forest Service check list has been followed in most cases. The author, Willard A. Eliot of Portland, has made the study of trees his avocation for some years, having previously written a book on birds which has been very popular. His new field manual of trees is a real contribution to the people of the Pacific Northwest and should do its part in making them more "tree-minded" and so more "forest-minded."

THORNTON T. MUNGER,
Pacific Northwest Forest Experiment Station.

How to Make Forestry Pay. By Richard Coke. *24 pp. W. Heffer & Sons, Ltd. Cambridge, 1938. 1s.*

This brief exposition, a sequel to *Estate Woodlands* published by the Royal English Forestry Society in 1937, helps further to clarify features of the private forestry problem as encountered in England.

The author summarizes the apparent causes of the landowners' apathy towards forestry. Insecurity of tenure, lack of interest by inheritors of forest estates, and in some cases death duties, all may discriminate against continuity of management. Uneconomic forest practices, resulting from a dearth of technical and economic knowledge, may produce low returns. The difficulty of obtaining a fair price for products may present a number of marketing problems of importance. Rabbits, squirrels, and deer may be destructive in the woods and are difficult and costly to suppress. No mention is made of taxation other than death duties or to risks such as fire, insects, and disease.

To encourage forestry the author states that increased public and private cooperation is necessary. He urges that all owners of woodlands should become members of the Royal English Forestry Society. Other recommendations include: promotion of continuity of management through increasing interest in forestry; solution of marketing problems by developing marketing associations, by furnishing information relative to demand and supply and by cooperative sawmilling of low-grade timber; extermination of rabbits or effective fencing of the woods; and training of foresters and woodsmen.

A major part of the booklet considers silvicultural systems. Of the three methods discussed, namely: Coppice with standards, even-aged woods with ultimate clear-felling and renewal, and uneven-aged woods with no clear-felling, the author strongly favors the last and urges that in its use "every effort must be concentrated on *value* not merely *volume* per acre."

A. Z. NELSON,
U. S. Forest Service.

Growth of Douglas Fir Trees of Known Seed Source. By Thornton T. Munger and W. G. Morris. *U. S. Dept. Agric. Tech. Bull. 537. 40 pp., 7 figs. 1936.*

The increasing importance to forest planting of definite information on the behavior of progeny from specific parent trees makes the appearance of this publication particularly timely. In view of the many practical suggestions made, it is well worth reading by private timber operators as well as by other foresters.

The authors have summarized the data collected over a period of nearly 20 years from a group of five plots established in widely separated localities in western

Washington and Oregon. Seed was collected from 120 parent trees (in 13 localities) selected on the basis of differences in age, site quality, stand density, fungus infection, and altitude. The progeny were outplanted as 1-1 stock during 1915 and 1916; single rows of the progeny from individual parent trees were planted in each plot. The plantings were remeasured 10 times and the results analyzed. The general purposes of this study were "to determine from what class of tree the best seed for artificial reforestation may be obtained; to determine the influence of locality upon the seed collected for use in artificial reforestation; to determine what classes of Douglas fir make suitable seed trees to leave in logging operations."

On the basis of total height attained in 1931, the authors conclude that no significant differences occurred because of "age of parent tree, the quality of its growing site, its growing space, and its condition of fungus infection." The progeny grew best at approximately the same altitude as the parent trees, though two stocks from a relatively low altitude grew equally well at all altitudes. The authors recommend that the seed collector "should match his seed source area to his planting area on the basis of climate, unless he knows from actual tests that a certain seed, although native to a different climate, is suited also to that of his planting area."

Progeny from Granite Falls and Darrington, Washington, "exhibited outstanding height-growth vigor even when planted in an alien environment. These excellent strains . . . can be planted with success at any altitude in western Oregon and western Washington, from the coastal hills to 4,600 feet above sea level." In connection with this last statement, though these progeny did as well at the highest altitude (4,600 feet) as the best of the others, all trees at this altitude were quite stunted. The authors indicate that the average heights of all trees planted on site V were decidedly below the averages for the other sites, and emphasize that from a practical standpoint "planting for wood production should be done on the best sites first. If volume growth is proportional to height growth, 1 year of idleness for a site II acre is a greater economic loss than 3 years of idleness for a site IV or site V acre."

The authors state that "Owing to the narrow limits of the areas over which parent trees were sampled, the boundaries of the areas occupied by the superior strains are not known. This experiment proved only that stock from certain parent trees in two localities was better than stock from certain parent trees in eleven other localities." It is interesting to note that the data in Table 9 indicate that in the Wind River and Mount Hood A and B plantations the Hazel and Fortson progenies did as well as the Darrington progeny. Furthermore, the 1916 planting of the Granite Falls progeny is no better than the 1916 planting of the Hazel and Fortson progeny at Wind River. Since Darrington, Hazel, and Fortson are in the same watershed and within about 25 miles of each other, there is reason to doubt whether the small number of parent trees from each locality provides a sufficient basis to distinguish these progeny as separate strains, in spite of the apparent superiority of the Darrington stock in the Siuslaw and Snoqualmie plantations. This doubt is further strengthened by the considerable difference between the 1915 and 1916 plantings at Wind River of the Granite Falls progeny (135 per cent and 103 per cent), which is difficult to explain on the basis of adequate sampling of a distinctly superior strain. This does not detract from the value of findings made in this study, but rather emphasizes the need for caution in interpreting the differences as indicative of definite and separate strains.

So far as the stated objectives of this

study are concerned, the statement is probably true that: "Practically, however, it matters little whether, for example, the densely grown, infected, or old seed trees included in this study were or were not pollinated partly by trees of the opposite types." On the other hand, if this experiment is to provide data on heritability, as implied by the authors in their many statements regarding heritability and hereditary tendencies, and their reference to these plantings as "heredity plantations," it is important to know whether the individual parent trees have been pollinated by the same composite pollen sample, representing fairly the range of male parents, or to know definitely the male parentage. We know little of the flowering habit of this species. Two female trees may bloom sufficiently far apart to be pollinated by a distinctly different section of the tree population. Considering the small numbers of parent trees of any one type used in the experiment, the effect of the male parents on the inherent qualities of the germ plasm in the progeny would certainly point the way to caution in the assignment of possible "inherent characteristics."

The fact that this publication is based on a fairly large number of observations enhances the value of the results, because all too many published works are based on only a few observations. In seed-origin studies the differences in height growth in the early years may not show significant differences, as the authors point out. To foresters it is obvious that final conclusions must be deferred until the progeny reach maturity.

In addition to the significant differences in bud bursting and cold resistance which are described in this bulletin, more detailed observations on anatomical, morphological, and physiological variations might well have been included. Investigations of this nature would add materially to our scanty knowledge of possible inheritance in forest trees and point the way to future lines of work. For instance, on a recent visit to the Wind River progeny plots the writer observed an apparent difference in needle length of two progeny that seemed to be quite constant. This is analogous to the apparent differences in needle habit of different strains of ponderosa pine, pointed out by R. H. Weidman in a report (now in process of publication) on a seed-origin study which was initiated at about the same time as the study reported in this bulletin.

More detailed comments on this bulletin are hardly necessary in view of the excellent review by Doctor C. A. Schenck,[1] which gives a comprehensive abstract of the bulletin, draws parallels with European experience, and emphasizes the need of similar studies with other important forest tree species. The significance of similar studies with many other tree species should be recognized as an important adjunct to the seed-certification program in this country.

In spite of the difficulties due to uneveness of site conditions and the large number of trees that had to be discarded because of injury, etc., the discrimination in the choice of data and the care in analysis reflect credit upon the authors. The information in this bulletin adds considerably to the limited amount of information on the benefits to be derived from seed-source studies, and should do much to stimulate future work along this line.

ALBERT G. SNOW, JR.,
Northeastern Forest Experiment Station.

[1]Der Deutsche Forstwirt 20: 65-69. 1938.

Beltrami Island, Minnesota, Resettlement Project. By R. W. Murchie and C. R. Wasson. *Minn. Agric. Exp. Sta. Bull. 334. 48 pp. Illus. 1937.*

One of the major problems in securing proper land use and rectifying past mis-

takes in land use is the removal of backwoods farmers off lands submarginal for agriculture onto more suitable lands. This problem was tackled in 1934 in the Beltrami Island and Pine Island areas in Minnesota under the land retirement program of the Agricultural Adjustment Administration of the U. S. Department of Agriculture. This bulletin deals primarily with the problems and processes of social readjustments resulting from the Beltrami Island Resettlement Project.

The area concerned is either peat bogs or low, sandy islands originally covered to a large extent with forests of commercially valuable timber. Nearly all the people living in the area moved into it after 1910. Much of the land was drained under a Minnesota law which provided that a district judge could assume jurisdiction on the petition of "one or more persons whose lands are liable to be affected by or assessed for the expense of construction" of any proposed ditch. As a result, an extensive ditch program was started in 1912 and continued until the war shut off the municipal bond market in 1917.

When the timber was depleted, income was not sufficient to pay the heavy ditch liens, and tax delinquency mounted. In 1929 it became obvious that ditch bonds would have to be defaulted if left to the counties to pay. The state legislature created the Red Lake Game Refuge, took over the delinquent lands within the refuge and assumed the $2,500,000 bonded indebtedness against the area. The 1931 legislature designated six and one-half townships in the evacuation area as the Beltrami Island State Forest.

One of the first problems encountered by the Resettlement Program was that according to ordinary methods of land appraisal, much of the land had no value and in many cases was worth less than nothing. On the other hand, $20,000 to $30,000 a year of outside help was required to maintain governmental activities. This amount would be saved if the 300 families in the area were moved. Accordingly, the tax deficiency of $25,000 a year was capitalized at five per cent, or in other words, it was worth $500,000 to the county, state, and federal governments to evacuate the area and place the people where they could pay their own way. In many cases, after a value based on an appraisal of tax saving was placed on a farm, it was necessary to arrange a settlement between its owner, the mortgagee, and the county board. The result was that the owner salvaged some cash with which to start anew, the mortgagee accepted a small amount in satisfaction for his mortgage, and the county board accepted a tax settlement.

The most desirable of the lands available for resettlement were scattered over a wide area and interspersed with farms not available or not desirable for purchase. Plenty of partially developed good lands were available at reasonably low prices. Few of the moving farmers desired to shoulder the debt load involved in buying well developed farms, and these few were the least desirable risks. The grubstake principle was installed to meet the needs of settlers who obviously had but little capital. Under this plan, the individual was lent $60 for every $100 improvement he made on his property. The average amount loaned to self-supporting families was $1,700. It is interesting to note that the settlers resettled over a wide area, and did not attempt to maintain the three communities that existed in the evacuation area. When grouping did occur, that of two farmers was the most common. Only a few groups as large as four families kept together.

Some thirty families will continue to depend on public assistance. In most of these, the head of the family is too old to be able to earn his living, and there is no one else employed at home. In other cases, the family consists of a widow and several children, or employable members

of the family are disabled. An average of $600 was spent to purchase lands and homes near one of the villages in the area for these people. The counties retain the deeds to these homes.

The people that moved out settled in areas where agriculture has proven profitable. The settlement makes these communities more compact and increases the tax bases in the communities concerned. It will be possible to close five schools in the evacuation area, but two new schools will have to be opened to provide for children of people moved.

The problem of isolated settlements in the cut-over regions can be met only by the complete depopulation of the poorer sections. Many of the social processes and problems involved are well discussed in this Minnesota bulletin. Foresters and others concerned with land use problems will find it profitable reading.

L. B. Ritter,
Bureau of Entomology & Plant Quarantine.

The Scenic Resources of the Tennessee Valley. A Descriptive and Pictorial Inventory. By Department of Regional Planning Studies, Tennessee Valley Authority. *xii+222 pp., 214 halftones, 7 maps. U. S. Govt. Printing Office, Washington, D. C. 1938. $1.*

Under congressional sanction the T.V.A. was authorized "to carry on studies and make plans for federal and state activities looking to the proper use, conservation, and development of the natural resources of the Tennessee River drainage basin and the adjacent territory." Holding that "scenery" is as real and important a natural resource of the Tennessee Valley as are its soils, minerals, timber, or water power," this publication would seem to be thoroughly justified.

This is a new departure in government publications in both scope and format. It is a compilation or inventory of the scenic features of the 40,600 square miles of the Tennessee Valley, and also of adjacent territory. It aims to include all scenic and recreational resources and developments within the Valley, regardless of public jurisdiction. For example, it treats of scenic and recreational resources, developed and proposed for development, within national and state forests and parks, and on T.V.A. and Resettlement Administration lands. It also includes proposed national forests, state forests (Fulmer Acts), and national and state parks. There are concise descriptions of each feature tide in by coordinates with the excellent colored maps. Its six chapters deal with: The Upper Tennessee Valley Area, The Asheville Area, The Knoxville Area, The Chattanooga Area, The Wheeler Basin Area, and The Lower Tennessee Valley Area. The Appendix presents an analysis of non-urban outdoor recreation by forms and types of areas, including regional areas and travelways. Regional areas are dividcd into "outing areas" (intensive-use areas and developed scenic areas) and "conservation areas" (wilderness and monuments). Travelways are classified as "motorways," "trailways," "waterways," "airways," and "waysides." As admitted by the authors, their system of classification cuts squarely across the prevalent classification which is based on jurisdiction solely. The authors also point out significantly the need for clarification of meaning of the words "park" and "forest." Federal and state foresters will be interested in this book, and especially in the Introduction and Appendix.

The book is well bound in cloth, the contents are well arranged, the maps excellent, and there is a wealth of half-tones, but unfortunately the quality of the paper detracts measurably from the beauty and effectiveness of most of the scenic forms.

Jno. D. Guthrie,
Civilian Conservation Corps.

CORRESPONDENCE

Editor's Note: There is much discussion nowadays of laws to be passed and action to be taken to place forestry in the United States upon a firm foundation of sustained yield. Most of these proposals are excellent, having such sound objectives as protection of forests from fire, education of landowners in better forest management, and building public sentiment to support forestry. Such suggestions pre-suppose a secure market for forest products, such as was the foundation upon which European forestry was built. But our present domestic lumber consumption is about 60 per cent of ten years ago and our lumber exports last year were hardly 40 per cent of 1928. Present markets absorb only about as much timber as is growing in the country. But by improved forest protection and refinement of the rudimentary silvicultural practices now in use, the annual growth increment can and will be greatly increased. What then of the future?

With these facts in mind, the questions raised in the following letter appear vitally important to members of our forestry profession.

June 4, 1938.

Dr. Francis B. Sayre,
Assistant Secretary of State,
Washington, D. C.

My dear Dr. Sayre:

You are dealing now with critical phases of the pending trade agreements with British countries. With respect to the objectives in terms of larger opportunities for export trade in forest products, I am well aware of the obstacles and of the conflicting pressures upon the trade agreements enterprise.

So I only wish to urge the constant consideration by yourself and your associates of the fact that the outcome of these pending negotiations with British countries will largely define the pattern to which the course of our foreign lumber trade hereafter will have to shape itself.

The Department of State has wisely determined and declared the American lumber industry to be fundamentally an export industry. For many years our national imports of forest products have exceeded exports. In 1937 these imports were more than double the exports, a fact frequently and easily overlooked inasmuch as nearly 90 per cent of these imports are duty-free.

This unbalanced ratio is incompatible with the objective of perpetuating the useful occupancy of our six hundred million acres of forest land, and of providing employment for hundreds of thousands who have now no other source of livelihood. This will be opened up in the pending investigations of the Congressional Joint Committee on Forest Conservation.

No nation with comparable forest resources today has so unsatisfactory a balance between exports and imports of forest products as has the United States. To no other nation does a restoration of opportunity for major export trading in forest products promise more in terms of increased employment opportunities and of rehabilitation of forest resources.

The unwholesome balance between our exports and our imports of forest products must be rectified. It will be far better that this be done through a restoration of export trading opportunities.

Yours sincerely,

Wilson Compton,
National Lumber Manufacturers Association.

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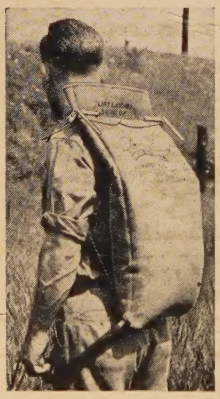

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